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ABSTRACT

The "Change" undergraduate teaching program identifies and describes some of the best undergraduate teaching now going on in American colleges and universities. The basis for election is a set of carefully developed criteria that define improved teaching in terms of learning goals and outcomes, with special emphasis on the adaptability of the learning experience to other disciplines. This document focuses on three disciplines: (1) chemistry; (2) history; and (3) psychology. Four of the best learning experiences from each field are presented, and some four or five other teaching experiences in each field are described. (Author/KE)

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From the editors of

Change

The Magazine of Higher Learning

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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1 REPORT ON TEACHING

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ANALYSES OF SOME OF THE MOST NOTABLE IMPROVEMENTS IN AMERICAN UNDERGRADUATE TEACHING

About This Special Report

Few issues in higher education spark as much heated debate as the quality of undergraduate teaching. Opinions on the subject are legion, but the precise elements of exceptional teaching remain enshrouded in academic folklore.

It seemed unavoidable for *Change*, as the leading monthly in academic life, to attempt to grapple with the complex problems of quality teaching; not only to acknowledge the difficulties that stand in the way of improvement, but also to identify specific examples of what it considers outstanding. The criteria used for our selection of teachers is of course open to wider debate. But one must begin somewhere.

Until recently, talented college and university teachers received national recognition from such sources as the much-cherished Harbison Awards. But these awards were found to insufficiently fire the imagination of other teachers and were recently dropped.

In *Change*'s new biannual Reports on Teaching, we hope to help demystify quality teaching, so that 600,000 college teachers may freely share in the triumphs and pitfalls of a few. By no means should our selections be taken as all that is worthy of national attention. They are simply illustrations within a wide spectrum of imaginative teaching that needs nurturing both locally and nationally.

These periodic evaluations of undergraduate teaching in America are made possible by the federal Fund for the Improvement of Postsecondary Education. It is particularly significant, in these times of occasionally excessive attention to public accountability and consumerism, that *Change*'s new effort is being supported by American taxpayers, and that these reports are being written by some of the most talented education writers in America.

—*George W. Bonham*

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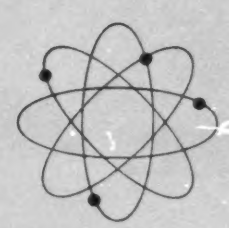

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On The Dangers of Teaching Too Well

by L. Richard Meeth

Assumption: Teaching, like politics, is both an art and a science. The art and the science of teaching are needed, not only to do the job well but sometimes to avoid doing it too well. The phenomenon of teaching too well was often described or implied to interviewers as they probed the teachers and the teaching experiences portrayed in this report. Four dangers came to light as these articles were being written.

The danger of being too popular. If you teach really well, students begin to find it out. They spread the word and classes begin to fill. Then new rooms have to be found and before long other faculty in the department are spending half their advising time registering students for your courses. Such an eventuality usually means that other courses decline in enrollment, unless the faculty catch on quickly enough and change some departmental requirements to redress the balance.

Popular teachers seem to like teaching, often thinking of the experience as a joy rather than a load, as it is described in most of the American studies of faculty activity. (See "Studying Faculty Workl[illegible]," *Change*, November 1975.) But some faculty fear becoming too popular because they may upset the value system in their department. As one chemistry teacher described in this report remarked, "Being obviously popular means your values are in the wrong place." It means that you appear to value a lively class over faculty esprit, relating to students more than drinking coffee with colleagues, preparing for class more than politicking in the lounge, and maybe even value teaching more than researching or publishing.

The danger of being too effective. Being too effective means that you have dared to measure or otherwise assess your own teaching and have found out that students learned—in fact, learned a lot. Not only that but you may have found that they retained what they learned and even continued to pursue their learning after your course was over. By making such an assessment, you first of all show how unusual you are, because so little evaluation takes place in proportion to the amount of teaching that goes on in the world. But, second, you take it upon yourself to completely reorder evaluation criteria—from input to output, from the way "we" teach to the way "they" learn. Thus, some faculty fear becoming too effective because they may upset the student evaluation process and consequently upset their colleagues.

"Don't evaluate extent or amount of learning," said one psychology professor (cited in this report), "because colleagues may show up badly." In fact, more than a few of the teaching experiences in this document have limited evaluations, not because students failed to learn and the professors were afraid they would appear incompetent, but because they strongly suspected that a lot of learning did take place and to document it might embarrass their fellows in the department who could not or did not gather similar evidence on their own teaching.

The danger of being visible. If you are a visible teacher, you receive scores of 9 or 10 on faculty rating sheets filled out by students. You can supply the promotion and tenure committee with different kinds of evaluations of your teaching, ranging from videotapes to student products. You may not publish more than your syllabi, may not head the community fund drive, and may not get a grant every other year; but when it comes to teaching, the department chairman, however reluctantly, must confess to the dean that you are a "good" teacher.

L. RICHARD MEETH teaches at the State University of New York at Buffalo. At considerable professional risk, he also directs *Change*'s National Project on Undergraduate Teaching.

Some faculty are afraid of becoming visible teachers for fear that they may upset the reward structure. Putting all their professional eggs in one basket and boldly setting them before the faculty personnel committee may force a reexamination of the criteria for promotion, tenure, or even for salary increases. Length of service traditionally rates a higher priority for advancement or salary increase than quality of service. Publication usually takes precedence over effective teaching for tenure. One very good teacher described herein nearly lost his position because he was more teacher than some of the other things judged important, until the students came to his rescue and the "judges" rethought the criteria for promotion. But once the rationale for reward has been challenged and the priorities rethought, what happens to all those loyal and loveable colleagues who have labored long toward the old criteria?

The danger of being too efficient. As everyone knows, if you teach really poorly you'll be fired, but if you teach too efficiently you may be made an administrator, which comes down to the same thing as being fired as far as loss to students and the profession is concerned. Efficient teachers, those who turn in student grades on time, who read student papers and respond quickly to the ideas and not just to the grammar, who know who and what they are teaching (in that order), who give organized lectures, practice various teaching styles, and know that their students know what they are supposed to know, catch the eye of administrators who need efficiency in their ranks as well. So the best teachers become deans, division chairmen, center directors, and sometimes even college presidents. The reverse, of course, rarely ever occurs. Good administrators don't move "up" to teaching.

Thus, some faculty fear teaching too well because they may upset the political balance. One history teacher interviewed for this report summed it up, "If you survive all the other dangers, 'they' still get you in the end." Not only does political equilibrium tip when a peer becomes a manager, but also if he is promoted for unacceptable reasons (such as good teaching), or made department chairman, or director of faculty evaluation or teaching improvement, or if he is moved into some other activity that thereafter requires a different response to an old colleague. Although you never leave the department circle, once you are recognized for teaching well the circle often becomes an oval, with you on the short curve whenever group policies are decided.

Incredible as it may seem, the politics, rewards, peer-group interactions, and existing evaluation mechanisms often work against doing the best possible job of teaching – or, at least, letting anyone know about it. Publishing the record of success of these 26 teachers may jeopardize relationships in their departments, may cause them to be promoted out of teaching, may make them prophets except in their own departments or universities. But worst of all, publication of their teaching achievements may elicit from colleagues, administrators, and the public no response at all. □

How Does Change's Undergraduate Teaching Program Work?

Twice each year, *Change* publishes a special Report on Teaching, devoted to describing some of the best undergraduate teaching now going on in American colleges and universities. The major disciplinary associations are cooperating in this effort by serving as the initial screening mechanism for identifying good teaching efforts, after which leading authorities from each field assist *Change* in making the final selection of those projects to be featured in each Report.

The basis for selection is a set of carefully developed criteria which define improved teaching in terms of learning goals and outcomes, with special emphasis on the adaptability of the learning experience to other institutions and other disciplines. (See "An Invitation to Participate," *Change*, November 1975.)

Selection also presumes a special cooperative spirit of those teachers involved, so that they may serve as a source of information and assistance to other faculty interested in adapting their methods. The 26 teaching approaches presented in this Report are accompanied by the name and address of the faculty person to contact for further information.

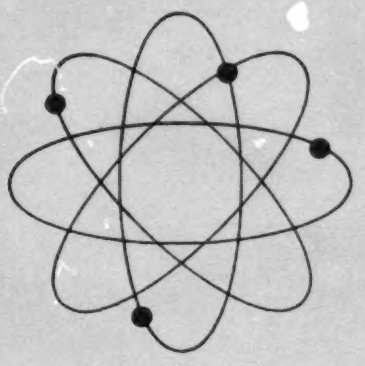
Each Report on Teaching focuses on three disciplines. Four of the best learning experiences from each field are presented, each the subject of an in-depth analysis written in lay terms by one of the leading education writers in the country. In addition, some four or five other teaching experiences in each field are described briefly.

Later Reports focus on the fields of political science, physics, music, biology, English, sociology, mathematics, and others. Faculty interested in participating should contact their disciplinary association.

CHEMISTRY

Balancing Chemistry's Priorities

by G. P. Haight



While chemistry curricula have proven themselves one of the more successful devices for training professional practitioners, they remain one of the greatest sources of academic frustration. Teaching at the upper levels has not, as yet, been particularly troubled. While individual problems do arise, often due to the gradual obsolescence of teachers and equipment in a continually evolving science, by and large teachers of upper-level courses are dealing with a well-selected group of students. A recent study at the University of Illinois, for example, found no junior-level chemistry majors who ranked below the ninety-fifth percentile in their high school classes. The roots of this selectivity lie in both the difficulty of introductory chemistry courses, and in natural limits to the numbers of those who have talent for and take pleasure in the solution of chemical problems.

G. P. HAIGHT is professor of chemistry at the University of Illinois at Urbana-Champaign and chairman of the Division of Chemical Education of the American Chemical Society.

Chemistry teaching at the introductory level, however, is deeply troubled, largely as a result of the increasing volume and sophistication of knowledge in the field. The principal problem here involves the selection of the material to be taught. Pressures to include a descriptive body of basic factual knowledge, along with principles governing chemical structures and processes, experimental techniques, and theoretical frameworks, all compete for a slice of the introductory pie. One consequence has been the excision of much factual material in favor of principles, theory, and sophisticated, modern laboratory techniques. (Recently, however, environmental concerns have appeared on the chemical scene, and the application of chemistry to the environment has encouraged a revival of descriptive material, especially in courses designed for nonmajors.)

The other side of the coin is the sheer volume of information that often seems to defy selectivity. Chemistry has shared the excitement of the rapid development of science, and chemistry teachers have in many cases been involved in this development. They have thus been generally sympathetic to a tendency to include the latest developments in their introductory courses. This has led to expansion of texts, terser summaries of information, and continued complaints from students about too much material, too rapidly covered. A year of organic chemistry in 1900 required a 200-page text. In 1975, 1,500 pages are covered in the same time.

A second problem in chemistry teaching is the expansion of the student population. This demographic expansion occurred during the post-Sputnik era when high school courses were upgraded through such projects as Chem Study and the Chemical Bond Approach. Thermodynamics, kinetics, and molecular or-

bital theory followed. Courses became more abstract and more sophisticated, at the same time as a large, new student population, less well-prepared and less sophisticated intellectually, appeared in chemistry classes. This led to a rash of efforts to design special chemistry courses for special people, *viz*, chemistry for poets, chemistry for liberal arts, chemistry for nurses, and chemistry for underprepared students. There may, of course, very well be suitable ways of teaching descriptive material without mathematics, chemical processes without physics, and so on, to students with limited backgrounds in such supporting subjects. But heated and divisive arguments regularly occur over whether introductory chemistry can or should be different things to different people—whether courses for nonspecialists are or can be different courses, or just watered down courses for the less competent. While experience shows that many casual students, especially in required chemistry courses, are less competent and less motivated than majors, many competent nonmajors take chemistry with genuine interest and are capable of outstanding achievement even in a course designed for chemistry majors. Which students to aim for and what spread of abilities and motivation to consider in planning courses for nonmajors probably troubles chemistry teachers as much as or more than any other single question.

A third source of trouble in chemistry teaching is the development of technical aids to teaching, learning, and communication. Technology holds great promise in many respects. It can display visual phenomena with film and easily edited videotape, and provide individual self-paced instruction through computers. But the time required both to review and create these teaching and learning materials is hard to impose on a teaching schedule. Moreover, ability to perform well on tests generally seems to be independent of the method of teaching. And in any case, well-written textbooks with carefully planned study exercises have provided individualized, self-paced study systems for two centuries, prompting one to wonder if the time and expense of developing new techniques is worth the effort. The problem, then, is twofold, requiring first the development of an array of technological teaching techniques, and second, effective incorporation of these techniques into existing curricula.

A fourth source of difficulty concerns the growing interest among some chemistry teachers in learning theory and educational psychology. Perhaps 50 percent of all students in introductory chemistry courses cannot operate at the Piagetian formal operational level essential to the attainment of chemical insight. Educators are seeking to define student goals and limited objectives, a development many think may discourage independent thinking on the part of students.

Most of these problems will be with us until and unless teachers of introductory courses can settle on a cohesive body of descriptive material to provide a basic chemical vocabulary; the levels of theory, explanation, and abstract thinking accessible to the students admitted to each course; and adequate systems either for selecting students for chemistry courses or for selection of courses by students themselves despite variations in their preparation, ability, and motivation.

The selection of material, in terms both of quantity and quality, is ultimately the governing concern. How best to deliver the material is an aggravating but secondary problem. In the words of one of my colleagues: "What can we leave out of what we must cover in order to get to that which is interesting? And why do we consider it most important to include that material we least understand ourselves?" □

In the hands of a committed professor computer simulation becomes versatile, fun, and effective. And above all, it makes students think.

The Potential of PLATO

by Evan Jenkins

It has been almost a quarter of a century since I dodged, dozed, and doodled my way through high school chemistry. In college I majored in English and shunned the sciences. My attitude—bias, if you will—did not change much in the years that followed. Can such a person, at the ripe age of 40, conduct even a simple experiment in so arcane a subject as organic chemistry? More to the point, can he come away understanding what he has been doing?

Indeed he can. I have done it. It took me about 20 minutes, starting from somewhere behind scratch. And may Shakespeare and Milton forgive me, but I enjoyed it and wanted more. My little triumph is a tribute to a computer-based teaching system called PLATO IV, and to an exceptional teacher, Stanley G. Smith, professor of chemistry at the University of Illinois at Urbana-Champaign. With their help I was able to understand the principle of something called fractional distillation of organic compounds, assemble an intimidating array of laboratory apparatus without out-Goldberging Rube, and arrive quickly through trial and error at a successful distillation. From a mixture of half pentane and half hexane I produced a little more than 10 milliliters of each component, each batch at least 95 percent pure. And when, inevitably, I blew up the still on my first effort, Smith calmly told me not to worry.

Ordinarily one does not blow up a still with impunity. There is likely to be considerable mess, possibly some scalding, minimally an annoying loss of time. But except for momentary chagrin, I experienced none of the expectable calamities. "Let's just put the apparatus together again and repeat the experiment," said Smith, and I did, and it worked.

For my experiment, though vividly realistic, was not real. It was a simulation conducted on the screen of a computer terminal. And it was so realistic, and so thorough, that I am convinced a whole roomful of die-hard English majors could go through the exercise two or three times and then do the experiment in the laboratory almost error-free. Certainly blowup-free.

Moreover, having Smith at my side was a bonus that someone a little more familiar with computer terminals and with chemistry would not need—a chemistry student at the University of Illinois, for example. The reason is that Smith's lessons enable the student and an improbably amiable and sympathetic computer terminal to interact very much as a student interacts with a tutor. In a real sense, this is individualized teaching, and it is carried out at the student's pace. The language the student uses is simple (basically plain English, not computer jargon), yet a dialog of sometimes startling complexity can occur.

Smith has designed his computer-based lessons—lecture as well as laboratory material—to anticipate a host of questions and help provide the answers. Errors are usually not corrected by giving the right answer immediately; more often, the student gets a clue to point him in the right direction while keeping him thinking. If errors persist, a key marked HELP gives the struggler access to still more guidance and, in extremis, the answer.

It seems virtually impossible for a student to move from one stage of a lesson to the next without understanding what he has covered—hardly the case in a conventional classroom or laboratory. As a chemistry department colleague of Smith's, Peter Beak, put it: "In a standard lecture, they're all sitting there, and some have problems and some don't, but you don't know which is which. With Stan's courses and PLATO, the student must think—he can't just sit there and be passive. But he can keep working, and get help, until he masters the material."

Stanley Smith, a lean 44-year-old Californian who has taught at the University of Illinois since 1960, epitomizes pedagogy without pedantry. Soft-spoken but intense, he reveals a deep love for his subject and a quiet zeal for imparting its charms and mysteries to the uninitiated. And in designing chemistry lessons to be taught to a student sitting alone at a computer terminal, he has taught the computer to explain, explain, explain.

It was about eight years ago that Smith became intrigued with the potential of the PLATO system (the acronym stands for Programmed Logic for Automatic Teaching Operation). The system had been under development at the university's Computer-based Education Research Laboratory (CERL) since 1959, and from the outset the goal had been not a mammoth fact bank or computational tool but a sophisticated and flexible instrument capable of teaching large numbers of students individually.

In its latest incarnation, PLATO IV, the system comprises a central computer (Control Data Corporation's

EVAN JENKINS is an assistant news editor for the New York Times. He is the paper's former national education correspondent.

CYBER 73) at Urbana-Champaign, and nearly a thousand Magnavox terminals. (The number of terminals and sites changes continually. As of late 1975, according to CERL's ebullient director, Donald L. Bitzer, 973 terminals were tied into the system from 146 sites. Roughly a third were at 25 or 26 sites in University of Illinois classrooms, but there were others at schools, colleges, military training centers, and commercial locations in 24 states plus the District of Columbia, with one in Stockholm.)

Development of PLATO over the years has cost $12 million, Bitzer said, with roughly half the cost paid by the National Science Foundation with the rest split about evenly between the state of Illinois and the Defense Department's Advanced Research Projects Agency. Patents on the equipment are held by the university. It is expected that authors of instructional material will retain the rights to it, but that has not yet been settled.

The cost of plugging into the system varies with distance and the number of terminals at a site. No one denies the cost is high, and that is the most serious drawback to PLATO as a mass teaching device. Terminals alone, complete with optional features, cost about $6,000 each. A telephone line can handle four terminals, but it costs roughly a dollar per mile per month. At a distance of 1,000 miles, an institution with 400 terminals—not an extravagant number for a major university—would pay about $100,000 per month just to connect with the computer at Urbana-Champaign. Assuming one can pay for the terminals and the communication, CERL charges a rather modest $2,500 a year per terminal to give the user access to anything and everything in the way of instructional material PLATO has to offer.

Two other PLATO centers have already been started, one at Florida State University and one in Minneapolis, Control Data's headquarters, where the computer serves local school districts as well as company training programs. "We're hoping that by the early 1980s we'll have a million terminals connected to perhaps 250 centers, with all of the centers interconnected," said Bitzer, who remembers that only 40 PLATO IV terminals were in use in 1972 and does not think small. "When you've got that many, you're talking about the price of a color TV set."

The system's versatility has made it adaptable to education at all levels, grade school through graduate school, and to almost any material save perhaps painting and sculpture. About 4,000 hours of instructional material are now available in more than 100 subject areas, from elementary reading and math to language, music, science, and social science. Chemistry students used the system for more than 30,000 hours in the 1974-75 school year, and its use for all purposes, including lesson writing, totals more than a million hours a year.

The CERL-developed terminal is rather a marvel, beginning on the outside with its 8-1/2-inch-square screen, called a plasma display panel because it consists of a gas mixture, mostly neon, sealed between two thin glass sheets. The panel has an "inherent memory," which means it is possible not only to display but also to design and draw graphs, charts, and figures and have them retained in the memory of the panel itself for the duration of an exercise. And in programmed lessons, displays can be animated. A grade-school youngster who successfully chooses from a number of words to construct the sentence "Man carries cat to house" will be rewarded by seeing the tiny figure of a man do just that; as I did my fractional distillation experiment, I watched the temperature of the solution rise and saw an instant notation as I removed each fraction of the distilled product.

One of the more exciting talents of the terminal is its sensitivity to touch. As optional equipment, the display panel has a 16-by-16 grid of infrared light beams surrounding its surface, and the computer senses when the beams are interrupted by a pointing finger. To assemble the apparatus for my distillation experiment, I touched each piece of equipment, then touched the place where I thought it should hook up. To control the temperature of the oil bath heating my hexane-pentane mixture, I simply touched the words "cool" or "warm" (but not quickly enough with "cool" at one point, and then a sort of starburst appeared on the screen and it was time to start over; my still had blown up). To collect a fraction of distilled material, I touched the receiver at the end of the still, just as I would do in a laboratory to remove it and pour out its contents.

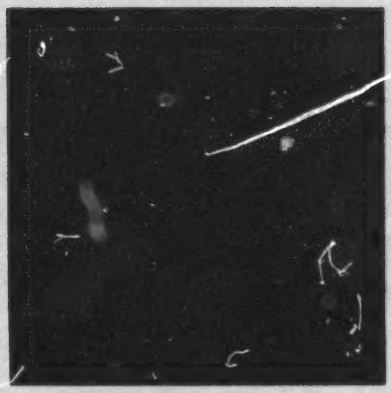
A more complex simulated experiment than mine illustrates both the flexibility of the PLATO system and Smith's ingenuity in fashioning lessons for it. In an experiment in the synthesis of organic compounds, the student is asked to convert one material into another—acetaldehyde into 2-butanol, for example—in a designated number of steps. A number of chemicals might be added as reagents to get the sought-after product; no single method is the only correct one. So in this problem and others with many possible solutions, Smith has taught PLATO to accept a variety of means to an end—whatever works.

There are fun-and-games aspects to the courses and lessons Smith has designed, and the term is not meant disparagingly. I did have fun doing an experiment in organic chemistry, even a simple one; I was also challenged and stimulated. And in the process I learned at least a snippet about a subject I had approached with antipathy. Opinions culled from students at the University of Illinois suggest that many of them respond the same way. And they do literally play games, competing from terminal to terminal in such rudimentary but essential exercises as identifying the symbols for elements (or the elements for symbols) as well as more complicated contests, such as racing each other from "stockroom" to "Nobel Prize" in synthesizing organic compounds. The ad-infinitum, ad-nauseam cliche is that learning can be fun, and of course it can; Smith and others working with PLATO have consciously built fun into the process.

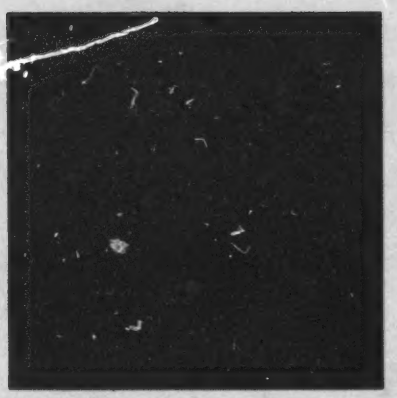
The value of Smith's simulated experiments, some of which are included in lecture lessons, is twofold. They prepare a student to understand and perform processes in a real laboratory with real apparatus and real chemicals; and they extend the laboratory experience by making available a large number of experiments that may be too complex, costly, or time-consuming for the student to do otherwise.

Smith has written PLATO "texts" for three courses. One is freshman-level general chemistry, with 28 computer lessons requiring an average of about an hour a week at the terminal. Along with his colleague Ruth Chabay, Smith hopes eventually to make the course almost entirely computer-based. A total of 32 lessons comprise

The start of a distillation experiment as it is simulated on the computer display terminal.



The computer reminds the student of a final preparatory step.



The line on the graph records the amount of material distilled at a given temperature.

the PLATO component of the other two courses. For sophomore-level organic chemistry it is a major part of the course, with the student spending about 30 hours a semester, on average, at the terminal. The sophomore-level organic lab requires about five hours at the terminal each semester, and the figure is increasing as more lessons are developed. Smith has also written four lessons for juniors and seniors in qualitative organic analysis and one for graduate-level students in physical organic chemistry.

The lesson content varies from relatively simple drills and problem sets to complex experimental and theoretical material. Roughly, writing a lesson for PLATO is equivalent to writing a chapter for a textbook, but there is a vital difference in computer-assisted education: Errors can be corrected and ambiguities cleared up as soon as they are detected, rather than five years later in the next edition.

Smith and others involved in PLATO emphasize that, so far at least, a computer terminal is not a substitute for the lecture hall or laboratory, but a complement. Smith suggests that it is a stimulating and enriching one that promotes deeper understanding. "What we've found," he said, "is that even though we keep the lecture sessions, or some of them, they're different. They're much more likely to be discussion sessions now."

PLATO has been programmed to collect data on student performance—time taken to complete a lesson, number of mistakes made, number of times the HELP button is tapped, and so on. Sitting in his office one day, Smith called up on his terminal bar graphs showing how students had handled a lesson in the interpretation of nuclear magnetic resonance spectra. One graph showed how many students made how many errors—20 made none, 28 made 15, and 1 made 45. A second graph showed the percentage of questions the students got right on the first attempt. In each case, the point was to see how the course material matched the ability of the students, to make sure it was neither too easy nor too hard.

The consensus at Urbana-Champaign and among outsiders familiar with PLATO is that it is effective as a teaching tool, but depends inevitably for its success on the human beings who control it. As for Smith, the consensus seems to be that a master teacher has meshed with a method he has mastered, and that the results are definitely positive. Students and faculty at the University of Illinois seem to think so.

"Use of PLATO increased my interest by questioning any answer I made. Very stimulating and also a useful tool in the UNDERSTANDING of the material. Use it more!!!!!" So reads one typical evaluation offered last year when Smith sought anonymous comments from students. Complaints seemed to focus narrowly. One student, for example, said he thought the PLATO lessons were good, but that the system's "refusal to accept answers mainly dealing with correct nomonclature is very frustrating and time-consuming." On that point, Smith was uncharacteristically inflexible, even adamant. "I'm forcing them to be precise," he said. "In this nomenclature lesson I said, 'You've got to get it right.' I think I'm right and he's wrong."

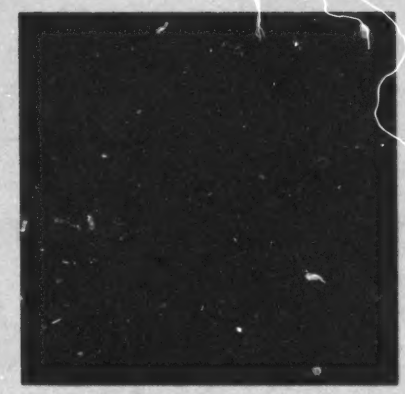
Two students I spoke to during my visit to Urbana-Champaign shared the apparently pervasive student enthusiasm. Gary Peltz, a Chicagoan taking a lesson in qualitative organic analysis when I stopped by his terminal, said simply, "It works, it really does. When you read a book you say, 'Yup, mmm, mmm,' but you may not understand it at all. This way you're asked questions and you have to know the answers before you go on." Kathy Miller from Princeton, Illinois,

Learning experience:
PLATO computer system (Programmed Logic for Automatic Teaching Operation). Material available for use in over 100 subject areas. Chemistry courses using the system: general chemistry, organic chemistry lecture and laboratory, and individual lessons for advanced chemistry courses.

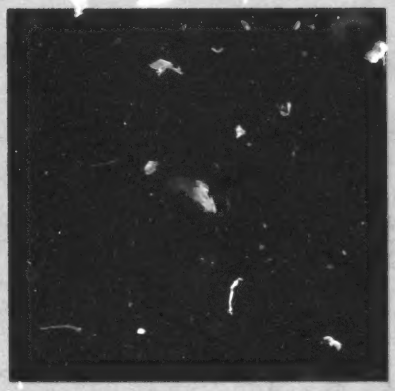
Other descriptions:
Journal of Chemical Education: "The Use of Computers in the Teaching of Organic Chemistry," September 1970; "The Use of Computers in the Teaching of Chemistry," April 1974. "Computer-Based Teaching of Organic Chemistry," Chapter 2, Volume 4B of *Computers in Chemistry and Instrumentation*; New York: Marcel Dekker, Inc., 1974.

Other institutions using the system:
Nearly 50 universities and community colleges tie into the system, among them: Purdue University, Parkland Community College, Champaign, Illinois; University of Arizona; Harvard University; Malcolm X College, Chicago, Illinois; and Cornell University.

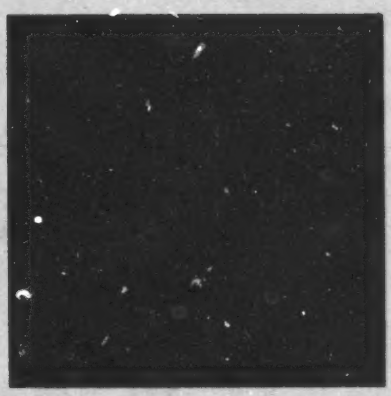
Contact:
Stanley G. Smith, Department of Chemistry, University of Illinois, Urbana, Illinois 61801; (217) 333-3839.



The graph shows that eight fractions of distilled material have been removed.



The student is asked to select two samples to complete the experiment.



This symbol appeared when the author blew up his still.

was studying an organic chemistry lecture on carboxylic acids. "If PLATO has to tell you because you don't know, it repeats until you do know," she said. "I think if it were optional I'd do it anyway. You can work at it until you know you've got it."

Those are subjective reactions. A formal comparative evaluation of PLATO's effectiveness is under way, but no findings will be available for almost a year. "I think—we all think—PLATO is a very valuable teaching medium where students do learn better," said Smith, "but we've been so busy working on its development and teaching with it that we haven't had time to work on evaluation per se. There is continuing evaluation, but mostly subjective."

In fall 1975, Smith asked for student opinion on the time efficiency of study with PLATO. Of 170 organic chemistry students, about 60 percent said they felt total time spent on the course was less than it would have been without sessions at the terminal, even though those sessions were added to the standard number of classroom meetings.

As for student performance, a colleague remarked: "The students all seem to rise to a reasonable level of competence with this system; the difference between the A and C students isn't that great. I don't know whether it's Stan Smith or PLATO—I think it's both—but I'm convinced the same students couldn't do it anywhere else. I've seen some real junk produced by computers in the hands of computer people rather than teaching people. Their approach is, 'What can you make the computer do?' Stan's approach is, 'What can it help the kid learn?'"

Educational Testing Service in Princeton, New Jersey, is conducting the study of PLATO with support from the National Science Foundation. Ernest J. Anastasio, principal investigator for the study, said he could not discuss any of his data at this point and emphasized that his focus was on reading and math programs for the elementary level and on other subjects—including chemistry—principally at the community-college level. But he said he was familiar with Smith's work, and expressed admiration for it coupled, however, with some reservations about PLATO in general.

"My impression is that one of the most significant obstacles in implementing PLATO in the classroom is training the teacher to use it," he said. "The instructor has to learn more than he would with textbooks, because he's already familiar with textbooks. This is a new set of skills. Stan Smith seems to have the right mix of subject matter, knowledge, experience with the system, and sympatico with the students to make computer-based education work. I'm confident Stan was a good teacher before PLATO and a better one after, but it's very hard to tell what makes a 'master teacher.'"

Frank Westheimer of Harvard has been familiar both with PLATO and Stanley Smith's use of it for several years. He has used a PLATO terminal experimentally in his own teaching, employing some of Smith's material and some of his own. Westheimer had been serving on President Johnson's Science Advisory Committee when he saw an early version of PLATO and wrote Smith, urging him to develop programs for it in qualitative organic analysis. "He took me up on it," Westheimer recalled, "and it's now my view that his program must be one of the best in computer-assisted education, period. In chemistry specifically, I think Stan Smith writes the best programs being written."

Westheimer devised a limited test of PLATO's effectiveness by adding it to the offerings in his elementary organic chemistry course, not substituting it for anything else. Some 75 students drawn by lot spent about four hours each at the terminal during last year's second semester. The other 75 did not. At the end of the term, a special exam was given to volunteers from each group. He found that those who had used PLATO did much better on the material covered at the terminal than those who had not.

"We learned a great deal," Westheimer said, "but before we run up the flag and cheer, I must point out that we should have given the non-PLATO students four extra hours of instruction by some other method. We know PLATO had an incremental effect; what we want to find out is whether it had a differential effect, and we didn't test that. So enthusiasts like me can come along and say, 'This is great,' but then we have to get honest and say we don't really know."

Meanwhile, he and others remain highly excited about the potential—and reality—of the system, given good teachers to teach it what to do. Enthusiasts seem convinced that cost problems will be overcome—and that they are dealing with the wave of the future in teaching. As Smith said, speaking of his recent work: "Whenever I get discouraged, I talk to the students. Then I feel all right again. They like it." ■

A nontraditional chemistry program at a nontraditional college offers a courseless, contractual approach to learning by researching.

Building Foundations

by James Benet

"Learning occurs in the learner," says former Dean of Sciences Donald G. Humphrey, who as much as anyone is responsible for the way chemistry is taught at The Evergreen State College. "We stand out of the student's way quite a bit."

The translation of these ideas into a program has produced a college dramatically unlike most others in America, and a chemistry curriculum that both shares and exceeds the unconventionality of the college as a whole. More explicitly than Humphrey's remarks, a college report explains that Evergreen's emphasis on individual learning programs precludes standard disciplinary majors. Students work on problems they themselves have chosen, in association with students and faculty of diverse interests. Nevertheless, the natural science faculty are confident they are preparing their undergraduates well. The methods are complex and to understand them one must know a little more about the college itself.

Evergreen was established in 1967 (it admitted its first students in the fall of 1971) as part of the Washington state system of public higher education, and was given a mandate to develop an alternative learning environment. As a result, it has no divisions, schools, or departments, no faculty ranks other than "dean" and "member of the faculty," no tenure, no letter grades (there is a system of narrative evaluations), no final exams, no bells, and no distribution requirements.

In general, there are four modes of instruction for credit: coordinated studies programs, in which a group of 4 or 5 faculty work full time on a selected theme or problem with about 100 students; group contracts, with 1 or 2 faculty members and a group of students working full time on a narrower focus; individual contracts between one student and one faculty member; and part-time "modules," in which faculty teach specific skills or subject matter, and which some predict will one day be recognized as courses. Credit may also be obtained for off-campus internships and work experiences related to student learning and career interests.

Students accumulate their records in a portfolio, which contains not only official descriptions of past programs, contracts, and credit reports, but also an evaluation by the supervising faculty member, the student's evaluation of himself, and samples of the student's work. When proposing to make a new contract or to join a program, the student must submit the portfolio for inspection—a powerful motivating device.

This structure is still evolving as the college, after all, is only in its fifth year. The modules, for example, were added to the original structure in the third year, though with some reluctance since it was clear they were a step in the direction of conventional courses. Still, the faculty had to face both the needs of the students for specific skills and pressures from the surrounding community for learning opportunities not requiring full-time commitment. But the modules are still limited; in the fall of 1975 the only mathematics modules offered were precalculus math, calculus, and beginning statistics.

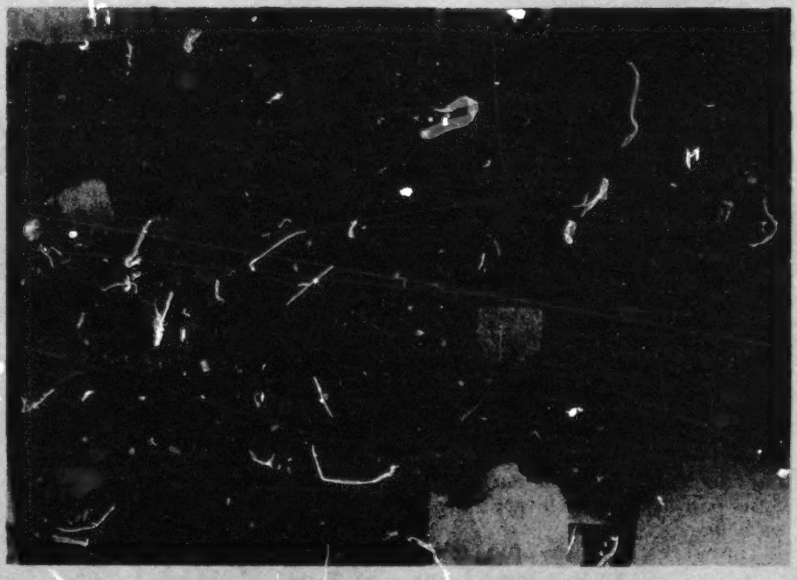
On the other hand, some of the "group contract" descriptions read remarkably like course descriptions. "Basic botany," for example, contains a list of topics to be covered, with assigned reading in five books; "lecture-tutorials" from 10 to 12 on Tuesdays, Thursdays, and Fridays, lab hours, field trips, and a list of required equipment.

Beyond its instructional frame-

JAMES BENET is the education reporter for KQED public television station in San Francisco.

work, the college has provided for its science students a superbly equipped laboratory building with a special area for "self-paced learning" that is developing extensive capabilities. Yet it is a mark of the college's rejection of departmentalization that ceramics studios, a shop for wood crafting, and one for metal sculpture mingle with the science laboratories. Although most activity in the Self-Paced Learning Center concerns some aspect of natural science, its carrels equipped for audio cassettes are also used by language students.

Up to the present—and it is still early to be judging the college's program—the structure seems to be working remarkably successfully in the physical sciences, though somewhat less well in other academic areas. Varied reasons are suggested for this: In our society, scientists may have more confidence in themselves and a clearer direction than other academics; or, alternatively, the natural science faculty is of exceptionally high quality; or students attracted to science value the unusual opportunities for independent work. One science faculty member commented that the students in other fields who are enthusiastic about the college are those who like to read and write quietly and independently. But whatever the reasons, an observer quickly finds that the science students praise their college more than the other students do.



Carrels organize slide-tape, microfilm, audiotape, computer, color videotape, and electronic test stations in the self-paced lab. Below, geology corner includes a stereo zoom microscope and sound movie projector.

In this overall structure, the teaching of chemistry has maintained remarkable rigor in spite of its fusion with other subject matters. What comes closest to the conventional sort of curriculum is a year-long, full-time coordinated studies program, "Foundations of Natural Science," to which interested students devote their entire second year. Since it is not required, however, some students will ignore advice to take it until they find their project work running into difficulties because they can't follow a book's argument, say, or deal with needed mathematics. In such cases, faculty members say, students may take "Foundations" in their third or fourth year, often with greatly heightened motivation. "One of the blessings of this structure is that you don't have any students who are unwillingly taking a required course," said one chemistry instructor. "Foundations" covers approximately the same material as a typical two years of undergraduate instruction in mathematics, chemistry, and physics, plus some of the work in biology. The teaching team is composed of professors from each pertinent discipline.

Jeffrey Kelly, the chemist on the current "Foundations" team, received his doctorate in chemistry from the University of California at Berkeley. He worked at the Lawrence Radiation Laboratory and taught at Reed College before coming to Evergreen in 1972. "We leave some things out," he says. "For instance, we don't do optics. But we teach chemistry and physics with calculus, which we can do because we know the students are learning calculus at the same time. We don't use interdisciplinary texts but hard, nationally known texts, so nobody is likely to say at another school that we give a low-quality course.

"The program is structured so that we hit the major concepts at least three times, and we pick specific topics to illustrate the concepts with that in mind. For instance, we have a lecture on neurophysiology in which our mathematician explains capacitance—here he's really teaching physics—and shows how the field equations he has discussed earlier apply, and how to solve them. Then I review the equations for ions in solution, with references to thermodynamics. And in the final part of the lecture our biologist talks about the nerve membrane, and how its capacitance depends on the ion concentrations on each side of it, and how the capacitance supplies the energy for nerve conduction.

"In the lab, the first three weeks are spent on computer programming so that lab topics reappear there three weeks after the lecture sessions, with consequent reinforcing. And in the second quarter, when we begin organic chemistry we take up structure, bonding, and thermodynamics all over again from that point of view with even further reinforcement."

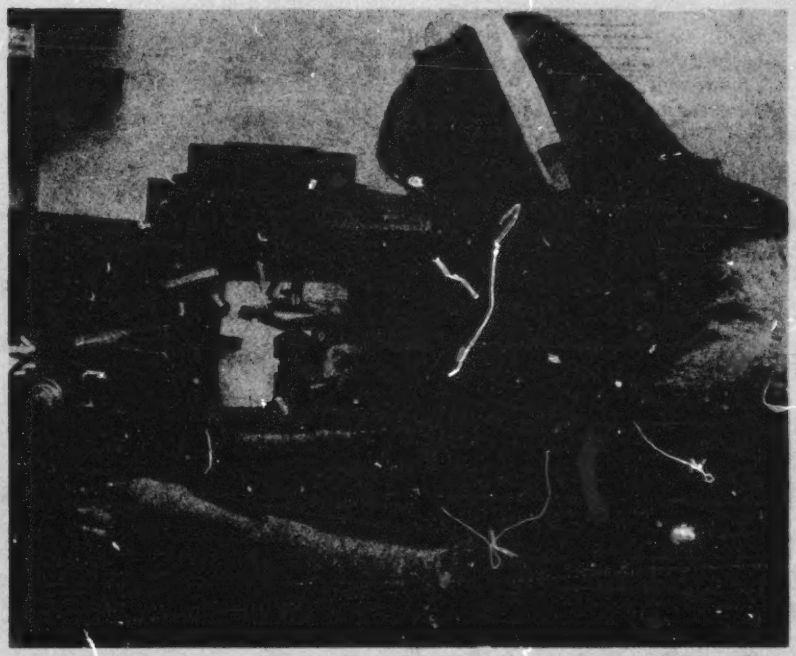
But, says Kelly, this sort of teaching takes a lot of faculty time and effort, as each member of the team must be continually aware of what the others are doing. Still, as the "Foundations" course is resolved into a standard structure, that has become less difficult.

One of the reasons "Foundations" works so well, Kelly says, is that in its rather austere buildings the college has provided such fine equipment. "Instead of having a lab for 100 students in freshman chemistry, we have equipment for 20 or 30," he says. "We run them through in batches. That way we can have some intermediate level equipment and some 'Cadillacs,' like the scanning electron microscope. Our undergraduates can do graduate-level research, or higher."

The microscope is one of the prides of the natural science faculty, who note that while first-class universities have such equipment, they rarely allow an undergraduate to use it. "More likely he'd first see it in the second year of graduate school," said one instructor. But at Evergreen, any student may undertake training to use a microscope of 60 angstroms resolution in "a sort of driver's license system," a faculty member explained.

Another key to the success of the course is the flexibility of instruction provided by the "Self-Paced Learning Units" (SPLU) assigned along with textbook reading and lab work. For example, a learning module on the structure of atoms in the "Nature of Chemistry" series offers the student (in addition to assigned reading in six different textbooks) three film loops; two computer drills; one lesson with audiotape and workbook; and a computer-generated, self-administered test. The computer, of course, provides faculty with an analysis of test results.

The faculty has produced dozens of its own programmed texts, ranging from "Use of the Nikon Compound Microscope," a simple instruction manual, to "How to Speak Biologese," a witty and ingenious demonstration of the structure of unfamiliar scientific terms that begins with "bicycle" and works its way to "mucopolysaccharides" and "gynandromorph." Other units combine audiotape with a slide projector, still others use videotape cassettes. The Self-Paced Learning Center—the "SPLU lab," as the students call it—is full of indexes, files, cross-indexes and lists of the units, as well as equipment for seeing and hearing them.



Projector instructs students on the use of the Nikon compound microscope.

The units can be both extensive and demanding. A unit on "atomic absorption," for example, contains a total of five and one-half hours of videotapes to be studied in conjunction with a series of looseleaf notebooks and other aids. The student may stop with the first elementary notebook, or continue as far as he likes.

Before and after spending a year on "Foundations," students acquire credit through group or individual contracts. Mike Beug, an organic chemist, describes "an integrated chemistry-biology course on an approach to solving ecological problems" in which he is one of the teachers. In two years, the course has received $175,000 in grants, he says, including National Science Foundation student research program grants for all four proposals submitted.

In the program, a group of eight students has been studying the effect of fluorides on the Columbia River, working outward from an aluminum plant that discharges into the river. They have been able to correlate data on plant damage and species diversity, among other things, with the level of fluorides in the water. "Our students have been doing phenomenal work, comparable to that of professional researchers," says Beug.

Evergreen expects faculty to rotate annually into other sorts of teaching, so Beug will now take on a year of teaching "Foundations." He thinks that's a good principle, to avoid the danger of having instructors teaching from yellowed lecture notes. The biologist in the integrated course will rotate, too. But in a year, the course will be back and running full blast again.

Individual contracts are the preference of the devoted student who sees his goals, but they can serve other purposes as well. "I took on a student who was interested in using the electron microscope to photograph natural forms," says Don Humphrey. "He was just interested in images, and I agreed to teach him how to obtain them. He made some beautiful pictures. But after a while, of course, he became interested in electrons, and how they were useful in a microscope, and then in the animal and vegetable materials that he was photographing."

That is part of the Evergreen idea. "To draw out a student, starting with his interests, is quite different from laying your thing on the student," says Humphrey. "Students today are tired of being dictated to by faculty. That's why our project method works

for them. As the students change each year we change 'foundations' a little accordingly. But there are various ways of motivating them. Some are turned on by 'Foundations,' some by projects."

If undergraduates may use the electron microscope, they may, of course, also use the other well-equipped labs. Group contracts are usually assigned a lab for the life of the project—normally a year—and furnished with whatever equipment they need. Some say the facilities at Evergreen are years ahead of those in any other undergraduate program.

A final, less formalized mode of instruction is the widespread use of the undergraduates themselves as teachers. The SPLU lab, for example, is staffed entirely by undergraduates. In other institutions one would expect graduate students in these jobs. But Evergreen has no graduate students and so the undergraduates benefit.

It should be emphasized that the "Foundations" program is an evolving and experimental one. Any description is likely soon to be out of date. Don Humphrey makes the point particularly clear by explaining that the present "Foundations" program grew out of experience with the original "project" scheme of the college. A coordinated studies program called "political ecology" came up against "bump points," he recalls. They found their students simply had to have calculus and organic chemistry before they could proceed. "So we designed a program called 'Matter and Motion,' which used calculus to do physics and ultimately thermodynamics. We found that the students' motivation was tremendous."

The Evergreen way doesn't cost any more. As Humphrey points out, the legislature insists that it receive the same support as any other state college. And, he adds, not much money has come from outside. The only big foundation grant is one from the National Science Foundation for about $1 million over three years, under the "restructured undergraduate learning environment" program. This is aimed at both curriculum development and evaluation of the school by an outside evaluator. "But we aren't tied to it," says Humphrey. "We aren't supporting anything basic in our program with soft money."

Clearly, the transfer of the Evergreen program to another institution would be very difficult. As one faculty member said, "There, everyone has his turf established, with distinctions between tenured and nontenured faculty. In this college everything is new." Nevertheless, the college is eager to spread the idea. "We save one place in the SPLU lab for a community college person," says chemist Robert Barnard, "so that his college can send him half time and let him have a little freedom to develop. I think other institutions could also send graduate students here to teach, as a test of how they're doing."

> *"The college has provided for its science students a superbly equipped laboratory building with a special area for self-paced learning that is developing extensive capabilities.*

The science faculty is convinced that the "Foundations" program is on the whole successful. "I think the sciences do well, mathematics not so well—because it's so sequential—and the social sciences very well," continues Barnard. "Our science graduates are very adept at instrumental work and at how to present results. They go to state agencies, ecology departments, quality control in industry, and move very well into real lab operations, perhaps years ahead of the conventional student."

Mike Beug agrees, with one reservation. "If a student wants to go into any field that requires broad preparation— medicine, for instance—this is very good and he'll do very well. But I wouldn't advise it if he wants to go to graduate school in chemistry or physics, because he'll be short on courses and long on research. Here we don't teach advanced thermodynamics and advanced organic chemistry. But on the other hand, he'll be learning a lot of graduate school stuff here, and have more fun."

Don Humphrey isn't sure he agrees with that. "I had a student who learned advanced microscopy here, and he's now in theoretical biology at the University of Oregon and doing very well," he says. "I think it depends on the student. Perhaps we give them the more valuable assets of independence, knowing how to pace their work—a variety of experiences."

Student comments in the science fields are strongly favorable. "I have been able to do graduate-level work, and that's why I came here from Harvard," said one. "As a result of coming to Evergreen, I have presented a paper at a national symposium. Word-of-mouth reports among students are that they have a good record of getting into graduate school," he added. "A friend of mine wanted to get into the University of Washington. He didn't have some of the courses, but he went up there with the computer he had built and he didn't have much trouble getting in. I went there and showed them my published papers, and talked to them, and got in all right.

"The advantage of not having conventional credentials is that it scares off conventional students and the career-oriented. Here biologists are interested in biology. I think the student level is higher than at Harvard, not in terms of SAT scores, but in devotion to academic pursuits."

To such an endorsement a visiting reporter familiar with a score of western campuses can only add that he observed nothing to contradict it. A visitor to the Laboratory Sciences building at Evergreen sees classes, in labs and out, because they are often in semi-open areas, or have left the lab door open. And what the visitor notices is that they rarely look up because they are busy. ■

Learning experience:
Undergraduate chemistry program; 200 students involved in three programs: Chemistry and Ecology of Pollution, Foundations of Natural Science, and Biochemistry.

Similar programs:
Hampshire College; the University of Wisconsin, Green Bay; and the MIT Concourse Program.

Contact:
Robert Barnard, The Evergreen State College, Olympia, Washington 98505; (206) 866-6711.

Reaching out to nonmajors through issues that affect them deeply, this course in environmental chemistry also provides thorough grounding in scientific language, procedures, and basic concepts.

Chemistry for Mankind

by Charles J. Sugnet

Bob West knew very early that he would be a scientist and by the age of 14 was working for a supplier making barrier metals to enrich uranium for the Manhattan Project. He analyzed the metal in his home lab, and successfully deduced the nature of this top-secret project—production of the atomic bomb. After taking a BS at Cornell and a PhD at Harvard, he became a very successful research chemist, specializing in organosilicon chemistry and receiving an award from the American Chemical Society for his work. During the same period, he climbed and named over 40 new peaks in Canada and Alaska, writing papers on glaciology and mountain exploration. Bob West is now a full professor in the chemistry department at the University of Wisconsin at Madison. He is an intense man.

Like many who achieve success through intense effort, he broadened his interests as he passed the age of 40 during the late 1960s. He became an officer of Zero Population Growth and president of the free high school in Madison; later, he helped to start a series of undergraduate seminars on science, man, and society. When the department chairman asked him, in 1969, to teach an honors section of the introductory chemistry course, he answered: "Yes, provided I can do what I want with it," and spent the summer thinking, reading, and devising experiments for the course. The problem as he saw it was the narrow nature of the standard introductory course and textbooks, and the exclusively research ethos of the chemistry profession, which did a fine job with the education of chemists, but neglected the nonmajor.

CHARLES J. SUGNET teaches literature at the University of Minnesota.

West saw three possible approaches to chemistry for the nonspecialist: historical, philosophical, and environmental. Although the first two had certain advantages, they did not give the students hands-on experience with the way science and technology work in the twentieth century, and did not capitalize on a strong interest already present in the students. The environmental approach could do both, while enabling the instructor to express his own concerns about the bad effects of unbridled technology and the worsening reputation of science among the young. Thus, he decided to design an introduction to chemistry oriented toward environmental issues. At that time, only a few others around the country were considering such a course; there were almost no precedents, no textbooks, so that everything had to be designed from scratch.

The course West put together is called "Chemistry for Mankind," and grew from its enrollment of less than 50 honors students in 1969 to a fall 1975 enrollment of 175. No longer just an honors course, it is a regular annual offering of the chemistry department, satisfying the college's breadth requirement for a lab science and serving as a prerequisite for those wishing to take further chemistry courses. In addition to relating basic chemistry to environmental issues, Chemistry 107, as it is now numbered, has introduced a successful new contract grading system. In Wisconsin's extremely large department (45 full-time faculty), about 1,000 students a year still take the conventional introduction to chemistry, but West's course has influenced the content of these classes, as well as curricular planning on other campuses. His office has answered over 300 inquiries about the course.

West assumes that the students know the language of simple chemistry and begins the course with a fast introduction to atomic structure and chemical bonding. Programmed texts and assistance from teaching assistants (TAs) provide help for those who have trouble, so that students with no previous exposure to chemistry can successfully take the course—they just have to do much more work at the outset. The course then moves directly into four major blocks of study:

- *Water Quality*: special properties of water, phosphates and eutrophication, measuring dissolved oxygen, etc.;
- *Organic Chemistry*: fossil fuels, pesticides, soaps, polymers;
- *Biochemistry*: fats and oils, car-

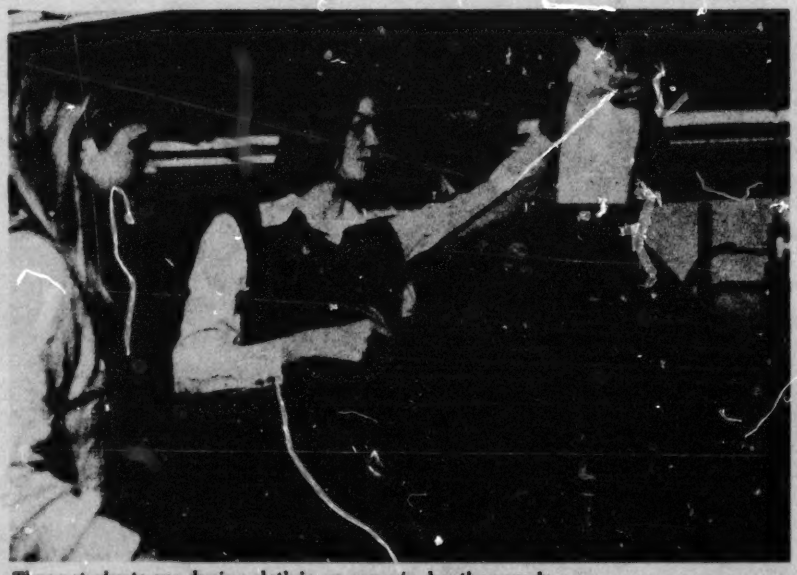
bohydrates, amino acids, nucleic acids, protein synthesis, food additives, drug action, steroid hormones, contraception;

• *Nuclear Chemistry*: decay laws, natural and artificial radioactivity, synthetic elements, fission, fusion, nuclear energy, nuclear weapons, effect of radiation on tissue. There is less emphasis on such things as stoichiometry, measuring heat of reaction, and gas pressures than in most general courses, and much more on organic chemistry.

Parallel to the treatment in class of environmental issues, there are assigned readings in the two basic handbooks (*Introduction to the Chemistry of Life: Organic Chemistry* by H. D. Embree, and H. J. DuBey's *Introduction to the Chemistry of Life: Biochemistry*) and handouts on basic subjects, e.g., naming hydrocarbons and their derivatives. A student who begins by reading about a controversial issue in one of the more obviously interesting books (J. L. Pyle's *Chemistry and the Technological Backlash*, for example) is soon driven back to the handbooks to obtain the basic chemistry necessary for clear understanding of the issue; this is in fact what happened to me in the course of preparing this article.

Thus, unlike many "environmental" courses, Chemistry 107 manages to convey to its students a good deal of basic chemistry. West believes that in order for his students to understand issues that will arise in the future, they need a clear notion of how the science itself works. But instead of leading them carefully through a single textbook, he gives them a syllabus, a variety of paperback texts, a special library for the course, access to TAs, models, and lab equipment, training them to use the resources as needed—teaching them how to learn.

The weekly course format consists of three one-hour lecture-discussion sessions, two one-hour small recitations conducted by a TA, and one three-hour lab also conducted by a TA. The large sessions convey some basic information (nature of hydrogen bonding, steps in a particular beta decay), but are increasingly a forum for larger considerations, with more and more of the fundamental chemistry being done in recitation sections or by the students on their own. This year four or five guest lecturers, some demonstration experiments, and several films were included. Although the class has over 150 people, West insists that there be some interchange between himself and the students—hence his term "lecture-discussion." Because the students are relaxed and interested and the chemistry hall is well-designed, this is not as difficult as one would expect.



These students are dyeing cloth in an organic dye they made.

West is not afraid of the political and economic discussion which arises naturally as a result of the chemical-environmental issues in the course; though he does not conceal his opinions, he avoids the kind of blunt, premature announcement of conviction that would stifle discussion. His views are socially and scientifically complex, and the course is in no danger of becoming a horse opera in which environmentalists wearing white hats triumph over evil, mustachioed representatives of industry and government.

During one lecture-discussion I visited, West spent the first half of the session describing the effect of radiation on somatic and genetic tissue, drawing on what the students had already learned about ionization and the structure of nucleic acids. He then discussed in detail the amount and sources of background radiation in the U.S., noting that nuclear power plants normally account for only an infinitesimal percentage of our annual exposure, while medical and dental X-rays account for much more than a third of it. He answered several questions, then showed a short film on the potential hazards of nuclear power, and especially of plutonium fast breeder reactors, made by a California environmental group. (On a previous day, the students had seen a film made by General Electric that presented the subject from a different point of view.)

> *"We, the staff of Chemistry 107, believe that learning in this course should be your responsibility.... We feel that the power to give grades interferes with learning as well as with genuine relationships between you and the instructors.*

The students asked many questions afterward about such things as the decay cycle of various fission products; the chemical similarity of strontium to calcium, which causes radioactive strontium to appear in bone tissue; and the health hazards involved in generating equivalent amounts of power by burning fossil

Bob West shows students models of drug molecules.

fuel. West sometimes referred to the students as a group a question he believed they should be able to work out on the basis of knowledge already acquired. Much of the discussion was technical, but it suggested the antecedent cultural, political, ethical, and economic questions about assumptions: Do we have to generate this much power at all? Do we have to choose between two evils, killing people by burning coal, and killing people with radiation? How could we use less energy? When a student raised these questions at the end of the session, West assured him that there would be time to discuss them during the next class.

The recitation sections conducted by the TAs are less lecture than workshop, where about 20 students freely venture questions and opinions. They typically begin with a brief business lecture (return of last week's problems with comment, description of an upcoming lab, clarification of difficult points in lecture or assigned reading). The instructor then invites questions and aids the students with current problems—a good deal of basic chemistry is gone over here. If time allows, the session moves toward a more general discussion of questions posed by the students or the TA. For instance, a session in which students learn to measure radiation might consider problems involved in storing radioactive material.

The TAs are generally self-selecting—that is, out of many eligible graduate students, these are the ones who want to work in Chemistry 107, because they share its environmental concerns, because they want to work with Bob West, or because they find the work itself more pleasant or stimulating. Some who have taught in regular general chemistry before find Chemistry 107 much easier to teach because the students are so involved. In the sessions I observed it was clear that the TAs were well prepared and knew many of the students individually. Each TA holds two small sections and keeps two office hours per week, encouraging groups of students to consult when feasible. In addition, TAs staff a coffee room for 10 hours a week, so that there is plenty of time for students to seek help.

Since so much of the course is devoted to organic chemistry, the lab period is similarly weighted. Organic experiments include such standard work as synthesis of fruity-smelling esters, but also include the use of gas chromatography for separation of compounds in such substances as butter, margarine, and cooking oil to determine amounts of saturated and unsaturated fatty acids present. The few inorganic experiments are also directly related to environmental issues (for example, spectrophotometric determination of the phosphorus content in an unknown water sample). Although lab work is not graded, each student must complete the experiments and reports to his or her TA's satisfaction in order to receive course credit.

The grading system, best described as a variation of contract grading, is unusual for a large introductory science course, and is an important element in the success of its discussions and question-and-answer sessions. The attitude of the staff toward grading is described in a handout to students: "We, the staff of Chemistry 107, believe that learning in this course should be your responsibility.... We feel that the power to 'give grades' interferes with learning as well as with genuine relationships between you and the instructors. As much as possible, we would like to give up this power over you, and leave you free to express your thoughts without fear of reprisal."

Grades are based on three things: two weekly problems, an optional paper or project, and an optional final exam. The problem sets are the most important component of the

grade and cover nearly every major aspect of the course. Two problems (usually referenced to the readings) are distributed each week, and the students are given a week to work on them. Some involve essay-type speculation and argument; others more typically involve the use of chemistry's own specific language. But everywhere the emphasis is on intelligence and understanding. When, for instance, the student is asked to write the structural formulae for certain polymers, he or she is also asked to speculate from the formulae on what the properties of those polymers would be.

Students are allowed to consult with each other and with the TAs about general ideas in the problems. In fact, the form on which the sets are done allows the student to sign one of two different declarations: "All of these results are my own independent work" or the qualifying clause, "except as explained below." If a problem is done incorrectly, the TA offers the student an opportunity to replace it by doing a similar one. A student who receives credit for all of the problem sets has earned a course grade of B.

About two thirds of the students choose to do a special project or paper in addition to the problems. Some do group fieldwork, checking the quality of nearby bodies of water or examining air samples from Madison for carbon monoxide pollution. The majority write papers on a wide variety of subjects, such as what happens to the chemicals in a cigarette when you burn it, how defoliants affect the environment, or what the chemical requirements are for a habitable world.

The TAs as a group judge the projects, deciding whether they merit an increase over the base grade earned on the problem sets. Each TA is disqualified from judging projects by the students in his or her own section, so that the student-teacher relationship will not be affected by grading considerations. The optional comprehensive final exam is also taken by about two thirds of the class, and is graded in the same way. Neither the exam nor the special project can reduce a student's grade below the base earned on the problem sets.

Students confirmed, both in person and in written evaluations, that they feel less tense and pressured under this system of grading. Having two problems to do every week is a bit relentless, but they appreciate the chance to work at their own pace, consult references, and do the work over again if they make an error—circumstances which approximate the way a professional chemist works. And once a student has successfully completed a few problem sets, the feeling of achievement cannot be wiped out by a few moments of panic on a one-hour test. One of the many beneficial results is that fewer students drop out in discouragement than in other courses.

> *"Unlike many environmental courses, Chemistry 107 manages to convey a good deal of basic chemistry. West believes that in order for his students to understand issues that will arise in the future, they need a clear notion of how the science works.*

Nearly half of the students are from the liberal arts college with a significant number from business or home economics. Some students had registered for the course because they saw the rough posters West had put up on campus, while others had heard favorable reports from advisers and friends who had taken it. Student evaluations and a growing enrollment show that the course has been well-received, and West was given the 1974 Amoco Teaching Award for his efforts in developing it.

A few students admitted that they had been almost totally innocent of knowledge or opinion about environmental issues when they registered for Chemistry 107. After watching the film on nuclear power, one youth pondered, with the thoughtful earnestness common among midwestern students: "Before, I always thought we should go ahead with breeder reactors, but I never thought much about what they'd do with the waste products. Now, I just don't know." It was a chilling reminder of how many important things it is possible not to learn in 12 years of schooling. But it was also gratifying evidence of the effect of the course. If it did nothing more than make students aware of such issues, Chemistry 107 would be worthwhile, but it also provides a grounding in basic chemistry useful for making decisions on the issues.

There is little doubt that courses linking chemistry to environmental issues work well and will become more and more common. When I asked Bob West if he had any practical advice for departments or teachers thinking of introducing such courses, he offered four suggestions, as he stood in his office in front of a bookcase filled with everything from technical manuals on organosilicon chemistry to Paul Ehrlich's *The Population Bomb* to Germaine Greer's *The Female Eunuch*, and topped with boxes full of parts for making molecular models, sticking up at angles you won't find in Linus Pauling's manual on chemical bonding. First, he suggested that a course like Chemistry 107 could not be drawn up by a committee without losing all of its sharpness; two good friends might manage. Second, he did not think it was good practice for a department to assign a professor to teach such a course. Only someone volunteering out of interest in the subject matter could make a really good course. Third, he believed that a course like this was difficult to prepare. Time and, if possible, money should be allocated to its development, so that the instructor could read widely, write up special lab assignments, and so forth. And fourth, he said, "It's worth doing. It's well worth doing." ■

Learning experience:
Chemistry for Mankind, no prerequisite, enrollment: 175.

Other descriptions:
"Revolutionary Chemistry," *Journal of Chemical Education*, October 1971; "Colleges Trying New Ways to Teach Science," *Chronicle of Higher Education*, April 12, 1971.

Similar courses:
Rutgers University, University of Maryland, and University of Texas at Austin. Various versions of the course exist across the country. (Since 1969, over 300 information packets have been sent out in response to inquiries.)

Contact:
Robert West, Department of Chemistry, University of Wisconsin, Madison, Wisconsin 53706; (608) 262-1873.

Stressing process over content, lab over lecture, a committed teacher uses traditional and innovative resources to guide her students through discovery learning.

Preparing the Creative Chemist

by Ronnie Dugger

Martha Gilleland, chairperson of the chemistry department at California State College, Bakersfield, has been getting good results teaching by the inquiry method, maximizing lab time, minimizing lectures, and challenging students to devise and solve their own experiments. "We are trying," she says, "to de-emphasize learning content for content's sake and to put more emphasis on applications and utility." She is trying out these methods in a chemistry department and a school of sciences and math that are wholly committed to innovative teaching.

As one document circulating in the chemistry department says, "The fact that California State, Bakersfield, exists is not widely known." The newest of California's state colleges, smelling pleasantly of continuing construction, it is a clean campus of rectangular surfaces of cream and light-yellow stucco and beige brick, a place of broad halls and vending machines in surprising places. The group of buildings stands out on a flat, open prairie outside of Bakersfield, a city of 180,000 in a section where the principal industries are agribusiness and oil. The college has about 3,000 students; the chemistry faculty of 5 teach about 500 students annually, and there are about 5 chemistry graduates a year.

John R. Coash, the dean of the school of natural sciences and math here, worked a couple of years on experimental educational projects at the National Science Foundation and "saw all this stuff people were doing all over the country sitting in files—but most of the other people didn't know about it. I also saw that often one guy was doing it, but the others at the institution were not interested." Coash wondered if teaching innovation would work in a state college system, and when the Bakersfield college was founded in 1970 with advance permission from the state to depart from the general pattern of curricula, "here came this chance to try."

In advance, Coash wrote out his rationale for using inquiry approaches in science at Bakersfield:

> The mass of facts now available prohibits any attempt to teach all. Rather, education in science must stress the discovery of facts, the handling of the data, and particularly the ability to change as new data and exploratory models are discovered and derived. Furthermore, if the specialist is not to become isolated, there must be continual reminders that the signals do emanate from nature, that the world, as that part of the universe to which we are yet closely bound, is still our laboratory....
>
> Flexibility of instructional programs will be stressed.... Lecturing will be minimal, and will be supplemented by individual learning opportunities. Laboratories will be open-ended, and will consist not of exercises but of investigative experiments, in part selected by the student. Hopefully, the process of education relegated to Mark Hopkins will indeed be revived, and, as someone has said, relabeled "discovery." An attempt will be made to begin the training of students "to function as creative scientists" through research participation early in their educational programs rather than reserving such activity for advanced students.

From the outset faculty were recruited who were game for teaching innovation. (They were asked whether they understood the rationale and wanted to pursue it.) Coash says this "prescreening out of the old fogeys" resulted in the hiring of "new young people who were kind of fed up with things." Thomas M. Watts, dean of the school of behavioral sciences, says this provided a chance to experiment without having "to walk over recalcitrant faculty."

The whole college became a laboratory. The Carnegie Corporation gave a grant to three California state colleges, including Bakersfield, to experiment in "personally adjusted college education," notably in modularized courses; Coash's school received a $230,000 College Sciences Improvement Program grant for similar experimentation. Coash found himself presiding over the first school of sciences wholly dedicated to "developing a unique, nontraditional, inquiry-oriented curriculum." In the last three or four years a wide variety of experiments in "self-instructional modules" has been tried out at Bakersfield, ranging from typewritten instructional modules for using a piece of equipment all the way to totally modularized courses, with no lectures at all, in physics.

One of the bright young people brought in was chemist Martha Gilleland, who was well aware that she and her colleagues had been hired "on the basis of willingness to experiment, to use new methods." When she was a student at Louisiana State University, she says, "the system was such that students went in, wrote as hard and fast as they could to get every word the professor said, and then spent two or three nights before the exam committing everything to memory." Textbooks were or were not read, depending on the student. "The lab was a set of weekly or twice-weekly meetings where students performed given exercises in unison. Sometimes they were interesting, sometimes they weren't. You

RONNIE DUGGER is publisher and editor-at-large of the Texas Observer. He is the author of Our Invaded Universities: Form, Reform and New Starts (W. W. Norton).

wrote the results down in fill-in-the-blank style."

At Northwestern, where Gilleland did postdoctoral study and was a quiz instructor, she sensed the system opening up a little with give-and-take sessions between the students and the quiz instructors and a tendency toward more open-ended experiments (in which procedures are known but answers are not). Beginning her career as a professor at Bakersfield, she carried the tendencies she perceived at Northwestern into a full commitment to inquiry as her method.

"Here," she says, "I'm trying to convey to the students that they are the learners and they have to exert most of the effort, and they shouldn't depend on me to tell them what the textbook says—that's why we have textbooks. I will interpret for them. They have to decide what interests them, with emphasis provided from me and the objectives. Essentially they're carrying a greater responsibility."

Each term her courses begin with a class in which she outlines her approach. "I emphasize that they have a list of objectives, a time schedule for completing reading assignments, that we are very much interested in their learning to learn, to do independent study. [I tell them] I will not collect papers or grade them much, except an exam here and there. It's up to them, and if they don't do it, they'll get behind fast. They seem to believe it."

She explains that in her introductory biochemistry course, "lecture is kept to a minimum...usually about one hour a week. We spend about the same amount of time discussing student-originated questions. Thus, out of 11 hours of scheduled meeting time per week, 2 of those hours are spent in the classroom. Six hours are spent in the lab, giving the students three hours to spend on learning modules and library work or on more lab work, as they see fit."

In her lectures: "I try to present an overview of that week's material—put it in perspective, show how it relates to things we've already studied, then pick out what I perceive to be the more difficult topics. It's a selected topics approach, with relatively few topics. Lectures are not comprehensive."

In the lab meetings her orientation is "to develop problem solving," to emphasize "learning science by doing science in as realistic a fashion as possible." There is ordinarily a great deal of memorizing in chemistry, but she tells her students, "I would like you to use this so much you can say it without having memorized it.

"We ask students to pursue experimental problems which they are interested in solving," Gilleland says. In the introductory biochemistry course there is a textbook (John W. Suttie's *Introduction to Biochemistry*), but also an optional lab text (*Experimental Methods in Modern Biochemistry* by George Rendina) and the latter can serve as a basis for experimental procedure and a source for projects.

"Students must prepare all of the solutions and reagents needed for their projects," Gilleland explains. "They must plan a strategy of attack on the problem, and they must interpret their results. Since these projects involve a rather large amount of work, students are usually asked to work in groups, ranging from two to five people. As the instructor, I am always present in the lab, and I give them as much advice as possible about the best experimental ways to achieve their goals. The plan is for the instructor to serve as a resource person—to give advice and to help students to use their time efficiently."

Since students have a hard time estimating how long a project will take, they need to be able to go into the lab at odd hours. "Our labs are open 14 hours a day," Gilleland says, "so that students can come in whenever the need exists, provided there is enough physical space to accommodate them. We see students working all day, and usually several outside students are present during lab periods that are scheduled for specific classes. Although there is a certain amount of disorganization, students find the activity to be invigorating."

There are, of course, difficulties. She started out not having an optional laboratory text, simply advising students to plan a project in groups of three to five. "We found," she says, "that the better students had ideas about problems they would like to investigate, but they didn't have much knowledge. Chemistry is built on procedures—you have to go to the library and find them. The freshmen in particular just were not knowledgeable about how one finds these procedures. The books they found in the library were often very high-level."

So it was decided that at the freshman level "we ought to give them more guidance, either by writing up experiments that illustrate principles, but are open-ended, or finding lab texts that are designed that way." In the first two or three introductory courses she chooses open-ended experiments for the students, but leaves a week or two open at the end of the quarter and asks them "to investigate a problem using the tools they've learned." Even then a list of problems for them to choose from is provided, but often students come up with projects that are not on the list.

Not every student can handle inquiry, Gilleland cautions. "We found that out early on. You've got to have a back-up. We furnish them with a list of possibilities. It's just basically the inventiveness that's not there—they don't have it inherently. You try to develop it as you go along. When they choose [a project], we try not to do any more than suggest some references."

In her introduction to a chemical principles course, Gilleland suggested that her students establish how much acid the commercial antacid pills react to on a cost-per-unit-of-weight basis, and they successfully did so, establishing one brand as best according to their tests. One student, realizing that she now knew how to determine acid content, brought in some homemade vinegar for analysis.

In basic principles of organic chemistry, Gilleland pointed out that since aspirin has a characteristic pattern of light absorption that is

Learning experience:
Inquiry approach to undergraduate chemistry curriculum.

Other descriptions:
"Report of the Third Biennial Conference on Chemical Education and the Second Centennial of Chemistry Celebration," *Journal of Chemical Education*, January 1975 (see page 23).

Contact:
Martha Gilleland, Department of Chemistry, California State College at Bakersfield, 9001 Stockdale Highway, Bakersfield, California 93309; (805) 833-3194.

measurable, the students could measure commercial aspirin for purity. They did this, taking care to obtain the freshest aspirin they could, and once again found that one brand was purest.

Upper-division courses in chemistry at Bakersfield are almost entirely project-oriented. Students are asked to perform, individually or in groups, large projects for a whole quarter. Before Gilleland gives her approval, she must be convinced that a project is tied to the course content and that the students have more than a casual interest in undertaking it. Is it connected to a college major, is it a hobby, or something they intend to pursue after college—what is their vital concern?

Flexibility is stressed in the lab. Only one experiment, identification of an amino acid, is required of all the students in Chem 313, concepts in biochemistry. While working on this experiment, they are asked to research a major lab project to be done in the remaining six to eight weeks of the quarter. Each student in Chem 313 has to spend a minimum of five hours a week in the lab.

In this course four of Gilleland's students decided, with her approval, to take a pure protein and find out which amino acids were in it. They hied themselves to the library to find ways to break proteins into amino acids and identify each amino. Selecting which method to use on the basis of time, cost, accuracy, and available facilities was a valuable part of the exercise. Another group analyzed the meat in commercial hamburgers bought in Bakersfield for fat and water content—their own idea.

Gilleland believes that the use of learning modules for self-paced study has caused a general slowdown of students' work. However, she does offer modules for optional use in her courses. "We have found it necessary," she says, "to have supplementary or alternative learning materials available for students who have obvious blank spaces in their scientific backgrounds." For the most part these materials are learning modules in basic chemistry and biology.

Working through one of these audiovisual modules—a filmstrip or photographic slides, audiotapes, and study guides—takes about an hour. Some were bought commercially; some were prepared on the Bakersfield campus. The chemistry department here also uses short film loops for introducing students to lab techniques. Study of the modules is never required in Gilleland's courses, but with each reading assignment one or more learning modules are recommended.

However, Gilleland and other members of the chemistry department here do not regard the learning modules as central. The students mingle with the five faculty members of the department casually and frequently and in general prefer professors to modules. One of the five, Melvyn L. Dutton, says the commercial modules available are not all equally useful, and often there is a problem of their being either too hard or too easy. Gilleland thinks such modules might be very useful in large institutions, but at Bakersfield the students "would still rather confront the professor face to face."

With so little lecture, and with lab projects and modules, are the students learning enough chemistry? They appear to be. As Gilleland says, "We don't test for the knowing. We test for the ability to do." However, between 1973 and the spring of 1975, on American Chemical Society standardized exams, inquiry-oriented chemistry classes at Bakersfield, more than half of them with audiovisual modules available, scored between the fiftieth and sixtieth percentiles in class averages.

In 1974 Gilleland said of the inquiry-oriented introductory biochemistry course, "We are convinced that this methodology succeeds in causing the students to function rather independently at an early stage in their educational careers. We are also convinced that this kind of experience better prepares them to function well in a real-life work situation. We feel that our introductory biochemistry course has been quite successful."

By the test results in Chem 313, too, she said, "Our students are indeed learning biochemistry," and from the overall figures on the tests, "I feel they are learning at least as much chemistry as elsewhere, and I think they are actually learning to use chemistry more than they are at other places."

During a meeting with 15 or so of the chemistry students, concern was expressed about the effects of the inquiry method on graduate exam scores. Randy Jelmini says that when the Bakersfield students have to compete for graduate entry nationwide, "they don't test you for the creative thing. I think it's great to learn to organize a project. Oh, great! First time it's tougher than hell. But they don't test you on that." Sybil Stramler wants more order in what she is taught; she wants her knowledge laid out in a logical hierarchy. But when these students were asked whether they were more interested and got more pleasure out of learning when they were challenged to devise and organize their own investigations, they all said yes.

There is an emphasis in the chemistry department as a whole on real-world problems. Fabian T. Fang, formerly the departmental chairperson, has supervised successful "student-originated studies" of the environment in and around Bakersfield. Student team studies of the relationship of air pollution to lung disorders in Bakersfield produced a report with informative conclusions, and a study concerning the polluting effects of oil used to kill mosquitoes in the area at least raised pertinent questions.

Gilleland's work may also be seen as part of the larger scene of experimentation in the natural sciences and math at Bakersfield. A group of three outside evaluators wrote, in a preliminary report on the College Science Improvement Program dated April 1974, that "there is a definable 'something different' in the teaching found in the school.... This 'something' takes on the vague shape of inquiry.... An overwhelming majority of the faculty favor a curriculum that will produce students able to formulate a problem and mount an independent attack upon it."

However, the three said, the most pervasive conflict with the inquiry mode of teaching is between content and process, "attaining a reasonable balance between the amount of background fact and basic skills which faculty feel are minimal requirements" versus "the development of the broader strategies of learning, understanding, and problem solving, which we call 'process.'" Inquiry, they said, involves both process and content, but places priority on process, and teaching content by inquiry is "time-inefficient." They thought this conflict should be clearly understood at Bakersfield and goals set for both types of learning. ■

Chemistry for Those Who'd Rather Not

At the University of Puget Sound in Tacoma, Washington, members of the chemistry department, when required to confront unregenerate humanities students, saw their plight as a challenge instead of a burden. They set about determining what a Latin scholar, say, ought to know about science, and came to these conclusions: that there is a vitality and excitement to science; that there is no boundary between the discipline of science and its philosophical-sociological implications; that an educated individual ought to have some basic knowledge of the structure of matter, energy, and the organization of the universe; that there is wisdom to be gained from dickering in the laboratory and learning modern instrumentation; and that one ought to understand the ways in which quantitation is essential to science. To teach it all, the department devised three courses.

The first, developed by Jeffrey Bland and Curtis Mehlhaff, is "Earth and Environmental Science." It probes the basic feedback control processes in the lithosphere, hydrosphere, and atmosphere, how they lead to a stable environment, and how man's real and potential impact on these processes can alter them. Students attend four weekly lectures and one weekly lab session for which a special text has been developed. Students are assigned papers in which they must analyze complex environmental problems and demonstrate their ability to substitute environmental dynamics for emotions.

The second course, "The Interface Between Living and Nonliving: An Appraisal," was developed by Bland and Darrell Medcalf. It discusses parthenogenesis, cloning, senility, abortion, extraterrestrial life, euthanasia, artificial intelligence, and the medical definition of death. Through lectures, discussions, and laboratory experiments, students are led from basic concepts of matter, molecular evolution, and molecular biology to the complex social issues they involve.

The third course, developed by Bland with James Clifford, traces "The Development of Science Through the Eyes of the Discoverers." This nonlab course examines historically and philosophically the lives and times of Plato, Aristotle, Copernicus, Galileo, Boyle, Newton, Priestly, Lavoisier, Dalton, Carnot, Pasteur, Kekule, Clerk-Maxwell, Einstein, and others. In addition to scientific method, the course considers such topics as the relationship of math to science, science's implications for future societies, and the definition of science.

The department measures its success with these courses by enrollment (out of a total college enrollment of 3,000, for example, nearly 300 students take the earth and environmental science course each year—most of them nonscience majors), by exam grades (students in the living and nonliving course continually demonstrate a knowledge of chemical principles comparable to those in hard science courses), and in both student and faculty evaluations. But the most significant criterion of success, reports Bland, has been the increase in the number of students who continue in follow-up courses. This, says Bland, "has become the rule rather than the exception."

For more information: Jeffrey S. Bland, Department of Chemistry, University of Puget Sound, Tacoma, WA 98416; (206) 756-3123.

A Resource Room of One's Own

At the sprawling West Lafayette campus of Purdue University, the enrollment in general chemistry is the largest in the nation—more than 5,300 students in the fall of 1975. Most of the classes are taught within the traditional lecture/lab/recitation framework, with faculty lecturing to large assemblies and teaching assistants providing most of the classroom instruction, in addition to directing and monitoring laboratory activity. Too many students competing for tutorial attention and limited lab space and time has inevitably resulted in a relatively high failure rate, accompanied by student frustration and dissatisfaction.

As part of a three-pronged approach to solving these problems, Richard T. Yingling has developed and outfitted a general chemistry resource room that offers a wide variety of materials of value in helping undergraduate students to learn the required subject matter. Open more than 60 hours per week, the resource room offers, in addition to free tutoring services by undergraduate honors students, an almost dazzling array of teaching/learning aids in various media: sample quizzes, examinations, and completed homework assignments; lecture notes and audiotapes; electronic calculators; molecular and crystal models; pertinent journals and selected reprints; a library of general texts and programmed learning materials; and such sophisticated aids as a cassette television system complete with numerous color videotapes, and dozens of audiovisual programs dealing with basic chemistry and mathematics. Student response to the resource room has been good, with visitations doubling in the second year of its existence.

Next in Yingling's efforts came the general chemistry help lab, developed in collaboration with Derek A. Davenport, head of general chemistry, and manned by the resource room staff. Open 40 hours per week, the help lab is a fully equipped laboratory for general chemistry students who have not found sufficient time to complete their experiments in scheduled laboratory sessions. The help lab has been used by well over 2,000 students.

The third prong involves the use of computers in two distinctly different ways. First, a course management and counseling program was written to provide periodic reports of student performance to teaching staff, academic advisors, and the students themselves. Computer compilation of pertinent data makes it possible to easily obtain class averages and score distributions. Lists of individual student performance, including class rank and letter grade, can easily be generated for the instructional staff. And each student can obtain a detailed progress report showing his class standing and grade for exams, lab, homework, and so on. The cost of producing a complete report for a class of 300 is about $50.

The course management and counseling program provides more rapid feedback on student performance than would normally be possible in high-enrollment courses. By so doing, it aids in early identification of students or sections of students doing unsatisfactory work, and also assists in detecting any significant variations in grading standards that may exist among the teaching staff.

A second set of computer programs was developed to process laboratory data and print summary data and graphs of laboratory results. Students report pertinent lab data and part of the grade for each experiment is based on the accuracy of their information. The ranges of acceptable experimental values are determined by computer synthesis of all student data submitted. Large enrollments thus become an asset, since the validity and precision of an average value increase with the number of measurements.

The success of the general chemistry resource room, help lab, and computer programs can be judged partly by the fact that while the percentage of students passing the general chemistry course from spring 1968 to spring 1972 was only 51 percent, that figure jumped to 70 percent in the spring of 1974, after the new programs were in operation.

For more information: Richard T. Yingling, Department of Chemistry, Purdue University, West Lafayette, IN 47907; (317) 494-5453.

Building the Skill and Confidence to Learn Chemistry

Located in a central urban development district in Cleveland, the metropolitan campus of Cuyahoga Community College attracts many students with learning deficiencies, according to Dean of Business and Science Louis J. Kotnik.

These students tend to concentrate on short-term goals to the exclusion of long-range commitments. They have little self-confidence, find extended concentration difficult, and lack effective study habits. Many must work while they are in school (70 percent of Cuyahoga's students have full- or part-time jobs). They become bored by drill and reject anything whose relevance is not instantly apparent. Having been taught to memorize formulas, they are unable to solve problems.

College-level chemistry texts are simply inappropriate for these students. Sentences are too complex, prior knowledge is too often presumed, and sample problems frequently omit several steps with the cavalier proclamation, "It is obvious that...."

So Kotnik wrote a book for his students (*Introduction to Chemistry*, Kendall/Hunt Publishing Company, Dubuque, Iowa, 1975). The first chapter explains how to use the book, and math is introduced only when it is essential in order to understand a chemical principle, at which time it is laid out step-by-step. Kotnik's text assumes the reader cannot divide.

The intended style of the book is breezy and, whenever possible, humorous. Each chapter begins by listing what the reader will be able to accomplish after reading the chapter and cites the pages covering each objective. The text avoids the passive voice.

Kotnik also created his own sets of slides, each limited to a single scientific concept ("What is an atom?" "What is an element?"). He discussed each script with the director of Cuyahoga's media center before submitting it to a cartoon artist (also a nonscientist) for illustration. Each set of 10 to 20 slides required between 60 and 80 hours to produce. After students viewed them, their exam grades shot to 80 and above, and most were over 95.

In addition, Kotnik has produced 30-minute television tapes to illustrate problem solving—one for simple problems, another for more complex ones. More tapes are scheduled to be made describing various lab experiments.

Curiously, underprepared students tend to be staunchly conservative toward education, and even though they may find lectures boring, they tend to resist any introduction of slides and tapes. Each must be individually convinced that he or she can make it through the course successfully, and that both materials and instructor are there to help. "It takes a supersalesman to do the job," says Kotnik.

Finally, the students are offered generous tutoring and permitted to retake failed exams. Kotnik has successfully introduced grade contracts as a way of stressing behavioral objectives and downplaying punitive grade systems. Further, students are allowed two hours (or more whenever possible) to take each one-hour exam. Though students seldom use more than an hour, the idea that extra time is available quiets those easily panicked.

Tight finances have prevented Kotnik from introducing the final stage of his remedial program: an open laboratory available to students 40 to 60 hours a week, with an instructor in constant attendance. In such an open lab, students could perform experiments, watch film loops, or listen to tapes. But even without it, when students finally enter the college's general chemistry course, they have shown pronounced improvement in handling complex problems and concepts.

"It's difficult to determine the cause of success when it occurs," says Kotnik (who had to turn the course over to a colleague when he was promoted to dean—a painful gesture since the course was his favorite). "We still do not know how much improvement is due to technique and how much is due to the improvement in the student's self-image."

For more information: Louis J. Kotnik, Dean of Business and Science, Cuyahoga Community College, 2900 Community College Avenue, Cleveland, OH 44115; (216) 241-5966.

Custom-Tailored TIPS for Students

"The professor is covering too much too fast. I'm confused."

"The professor is going too slow. I'm bored."

It was responses like these on a course evaluation questionnaire that made Bassam Z. Shakhashiri decide that something simply had to be done to individualize instruction in his introductory chemistry classes. But at the Madison campus of the University of Wisconsin, where enrollments for the two-semester beginning chemistry course usually number about 1,400, such an endeavor seemed awesome.

It was thus with some eagerness that Shakhashiri looked into TIPS—a computerized Teaching Information Processing System developed by Allen C. Kelley of the Department of Economics at Duke University. (The TIPS program in undergraduate economics will be treated in a forthcoming Report on Teaching.) Application of the system to the problem at hand seemed feasible, and CHEM TIPS was implemented at Madison in 1972 in a freshman chemistry course on an experimental basis.

The TIPS program, whose primary aim is to individualize instruction, is designed to monitor the progress of each student, identify specific strengths and weaknesses in his or her understanding of course material, and prescribe individual study assignments, whether of a remedial, supplemental, or enrichment nature. Another important objective of the program is to obtain student feedback that can be used to modify teaching strategies where indicated by class performance.

In addition to two professorial lectures per week, chemistry students have one laboratory period and two classroom discussion sessions conducted by a graduate teaching assistant. During the last quarter hour of the second lecture each week, students are asked to take a multiple-choice survey consisting of 5 to 12 questions aimed at measuring their grasp of current course content. The CHEM TIPS survey is entirely optional and is in no way used to make up part of the student's grade. The surveys are scored and otherwise processed by computer, freeing teaching assistants from needless busy work.

Within two or three hours after the survey has been administered, individual student reports are generated and placed in a box near the chemistry laboratory where they may be picked up at the students' convenience. The student report shows which questions were answered correctly and provides a summary score. In addition, the report contains specific, individualized assignments and messages that have been written and preprogrammed by the professor to cover both

The Real World in Miniature

At Hampden-Sydney College, a tiny men's liberal arts school in Hampden-Sydney, Virginia, chemistry has been offered with lab for more than 160 years. It is serious business: "Our students do chemistry as it's done by chemists today" is the departmental motto.

While traditional lab work in chemistry usually focuses on demonstrating principles learned in the lecture hall or classroom, the emphasis at Hampden-Sydney is on applying genuine chemical research techniques to real chemical problems. Gone is the cookbook approach, and in its place is a research-oriented program calculated to turn out students capable of holding their own as chemists in the real world. In the words of Herbert J. Sipe, Jr., associate professor of chemistry and one of the developers of the program, "Laboratory work is viewed not merely as training in specific techniques, but as attitudinal preparation for functioning as an independent professional."

Hampden-Sydney's innovative lab program consists in essence of a four-year series of laboratory projects constituting a completely separate set of courses within the chemistry department. From entering freshman to graduating senior, the student learns in gradual steps to define scientific problems, devise solutions with the aid of faculty and library resources, design and carry out relevant experiments, analyze and interpret experimental data, and communicate research findings both orally and in writing. Of special importance is the fact that each student's project is uniquely his own. Every student devises, researches, executes, and defends his experimental procedures, maintaining a research notebook throughout his college career.

The first two years of chemistry lab—a four-semester sequence—are devoted to acquiring skills and facility in the laboratory, and developing competence in experimental design. Projects at the freshman/sophomore level may range from 5 to 10 weeks in duration, during which time the student functions essentially on his own.

The third- and fourth-year lab sequences emphasize problem definition and design of complex experimental programs, sophisticated measurement techniques and error analysis, problems of instrumentation, and communication of experimental findings. Projects at this level may require one or two semesters for completion, during which time the student is given permanent laboratory desk space. Faculty monitor the student's progress in weekly meetings devoted to analysis of the past week's work and planning of the next. On completion of his project, the student prepares a journal-style research report and conducts a research seminar for presentation of his findings to his peers.

Capital investment for a program of this type may be high if a college has not previously involved students in experimental programs requiring sophisticated instrumentation; but once the initial costs have been met, operating expenses tend to be actually lower than those of conventional undergraduate laboratory work. Personnel costs, however, are inevitably high for an intensive program: Hampden-Sydney provides 1 senior staff member for every 15 laboratory students at the freshman/sophomore level, and that ratio drops to 1 to 10 at the junior/senior level.

But it's worth it, judging by the results. In the past 10 years, 90 percent of the students have gone on to graduate or professional school, and have been unusually well prepared when they got there, according to informal reports from their new instructors. Many Hampden-Sydney students have coauthored with faculty research papers for publication in professional journals; some have read papers at regional scientific meetings. The program has also received support from the National Science Foundation's Undergraduate Research Participation Program for 14 consecutive years.

And the students seem to like it. So much, in fact, that nonscience majors taking the first segment of the laboratory to meet the college's degree requirements generally compete quite effectively with the science majors. "There are few problems of motivation," comments Sipe, "when laboratory work closely approximates real chemistry, done as a real chemist would do it, using the most modern techniques."

For more information: Herbert J. Sipe, Jr., Department of Chemistry, Hampden-Sydney College, Hampden-Sydney, VA 23943; (804) 223-4381.

correct and incorrect responses to individual questions or groups of questions.

Students who have performed poorly receive messages informing them of their areas of deficiency and clarifying tutorial expectations for the week. Specific remedial work is assigned, and the student is apprised of available help services: study room resources, free tutoring by advanced chemistry students, and special help sessions with the professor.

Students who have performed well on the survey are so informed, and receive messages referring them to optional enrichment readings, as well as to special lectures arranged by the department. Additionally, such students find messages encouraging them to take up special projects in areas of individual interest.

Teaching assistants receive computer-generated section reports which give them breakdowns of responses by question (but not by student), and a list of assignments (but not scores) for each student. Thus the teaching assistant can follow up on each student's work, even though he does not know and cannot obtain the student's score for the survey. The professor receives a class report yielding similar information for the entire class. Staff meetings are then held in which professors and assistants analyze teaching effectiveness and student strengths and weaknesses, and discuss modifications to the current teaching program.

CHEM TIPS costs the university less than $2 per student per semester, the main expenses being computer time and wages paid to undergraduate helpers employed to handle the clerical aspects of the program. And it's well worth the price, according to all of the professors who have used it and found the rapid weekly feedback to be of great value from a teaching standpoint. Instructors also report that discussions with students regarding problem areas seem to be more clearly focused with the aid of CHEM TIPS.

Students responding to evaluative questionnaires have indicated that for the most part they do perform and benefit from the assignments suggested on the student reports, and an overwhelming majority have stated that the CHEM TIPS program "helps them learn the course material better" and "should be continued in the future." And it has been heartening to the chemistry department to learn through further questionnaires that students find the chemistry lectures interesting, regard the department as sensitive to student needs, and know that help is available when needed.

For more information: Bassam Z. Shakhashiri, Department of Chemistry, University of Wisconsin, Madison, WI 53706; (608) 263-2424.

HISTORY

Pulling History Out of the Doldrums

by C. Warren Hollister

The field of history is in crisis. During the past several years, history enrollments have plunged on most campuses. Teaching positions have been transferred from history departments to such expanding fields as psychology and the health sciences—if not abolished altogether. The history job market has shriveled, further discouraging undergraduates from declaring history majors.

Instructional improvement isn't the whole solution to history's crisis, but it is an important part of the solution. And historians throughout the country, along with their colleagues in other disciplines, have begun to approach undergraduate teaching with much greater seriousness than before. Even in strongly research-oriented universities, one finds a heightened sense of responsibility toward undergraduate instruction. One sign of this new emphasis is the rapid growth of the Society for History Education and its widely read journal, *The History Teacher*. Another is the creation, in 1974, of the American Historical Association's Teaching Division to support "the redefinition of teaching as a central concern of the AHA."

Still, most universities (not to mention the AHA) remain heavily research oriented. Publish or perish continues, and too often academic success is achieved through a combination of excellent research and mediocre teaching. While there have always been those who have devoted themselves to teaching out of a sense of responsibility rather than hope of reward, by and large, the urge to survive has kept teaching a low priority item among university professors. The situation can be changed only by rewarding first-rate teaching as we reward first-rate research.

Teaching cannot be rewarded without first being evaluated. And in the area of teaching evaluation there are both hopeful signs and puzzling problems. In the past few years, the idea of evaluating teaching on some kind of systematic basis has spread across the country. Many history departments and many colleges and universities have committed themselves to evaluations of one sort or other. But there is little agreement on how teaching should be measured, and by whom. Are students the final judge? Can effective instruction be distinguished from mere popularity (and is "mere popularity" necessarily deplorable)? What are the ingredients of effective instruction? Should students leave their courses with a well-structured body of information in their heads? Or a burning enthusiasm for history? Or a comprehension of how historical scholars think and work? What are the preferred methods of teaching history? Is the straight lecture method always to be condemned as unimaginative? Is the multimedia

C. WARREN HOLLISTER is professor of history at the University of California at Santa Barbara and vice president of the Teaching Division of the American Historical Association.

approach necessarily a descent into Disneyland?

Clearly, effective teaching comes in many forms. Two of the outstanding teachers of history on my own campus, A. R. Gollin and Harold Drake, have entirely different styles. Drake is witty, demanding, and immensely innovative, making extensive use of slides, tapes, videotapes, and film. Gollin, on the other hand, won't touch media. He lectures—and he is a brilliant, captivating lecturer (equally witty and demanding, by the way). But they share a willingness to give their very best to the challenge of teaching undergraduates. And students flock to their classes.

Unfortunately, few of us have their appeal. But their sense of commitment can be a model to us all. We need continually to rethink our courses, methods, and goals. Indeed, a great deal of instructional rethinking is occurring right now. In the past several years, for example, conventional survey courses in U.S. history and western civilization have been restructured, transformed, or abolished on many campuses. In some instances, emphasis has shifted from political history (drum and bugles) to the history of ordinary people—the majorities and the minorities. Other departments are adopting the idea, pioneered by Frederic Cheyette at Amherst, of an introductory course centering on major historical problems and how great historians have dealt with them. Still others have taken up the idea of replacing or augmenting the large lecture-survey with clusters of lower-division topical seminars. Elsewhere the old surveys are returning in revitalized form. William McNeill, in his recent *The Shape of European History*, has shown us that western civilization can be reinterpreted in novel and challenging ways, just as Kenneth Clark has shown us that western civilization can be beautiful (and can draw large, enthusiastic audiences).

All across the country there is a growing impulse toward innovation in history instruction. On one University of California campus, a multimedia course in the history of American popular culture is packing students in (and flunking some out); there are courses in the history of sex, urban crime, medieval magic, the inarticulate. There is a nationwide upsurge in the use of media: slides, slides with music, videotapes, clips from historically oriented feature films, and student-made films. There is growing interest in simulation and historical role playing, in computer-assisted instruction of various sorts—from simple autotutorial programs to the programming of data on American frontier history so that undergraduates can test the Turner thesis for themselves (devised by John Kolp at the University of Iowa). Less visibly but no less importantly, many historians are revitalizing traditional courses by reworking their lectures with all the skill and care at their command.

These are promising signs. One finds them everywhere, though not nearly as often as one might wish. The AHA Teaching Division is seeking to publicize these new approaches in a variety of ways—through regional, multicampus faculty development programs, teaching workshops, a national survey of innovative instruction, and teaching sessions and demonstrations at the AHA's annual meeting.

Perhaps historians are beginning to make some progress. On a number of campuses history enrollments are rising this year after half a decade of sharp decline. But the crisis is far from over. Much remains to be done. □

Professional standards are high in a course where students create media projects that make history relevant.

Making Media Work

by Henry Weil

One's first reaction is to scoff. College-level media courses have sprung up all over the country, and it often seems that the faculty teaching "Rhoda" critiques and the "Ethos of Rock" are qualified only by a feverish desire to pander to an ever more jaded student population. Those alarmed by this proliferation feel—not always unjustly—that 50 pages of text, contemplated at leisure, usually convey more information than 2 hours of film footage. Even within the realm of books, one senses instinctively that a lavishly illustrated text is at best an introductory work; true scholarship must invariably rely upon words alone.

So when one learns of the University of Delaware's "History Through Media" course, in which students create multimedia presentations as an approach to learning history, one's prejudices bristle. How can such a course have the integrity of one requiring written examinations and term papers? How can the mechanical clacking of slide projectors possibly be as serious as the quiet rustle of pages?

Delaware's History Through Media course grew out of the university's Media Center, which in turn grew out of the prodding of the American Historical Association (AHA). Early in 1969, the AHA, in cooperation with Indiana University's history department and Social Studies Development Center, established the History Education Project (HEP). HEP was designed to improve history teaching at all levels—kindergarten through doctorate. To promote more effective student-teacher communication, the project trained teams of historians to fan out through academe to restructure teacher training, reeducate working teachers, and establish centers where historians could get in touch with scholars from other disciplines—ideally to broaden the outlook of all.

The HEP team at the University of Delaware comprised two members of the history department, William E. Pulliam and Joedd Price. With the support of Willard A. Fletcher, at that time chairman of the department, they proposed that Delaware establish a media center to produce and coordinate a collection of photographic slides, specifically for use in history department lectures, but also freely available to the entire university community. Together, HEP and Delaware generated $20,000 to cover the cost of converting two history department offices, hiring a full-time secretary, and purchasing essential hard- and software.

The center's facilities were soon put to heavy use. Where slides had once cost a professor as much as $2 apiece, the center produced color slides for only 12 cents each and black-and-white slides for about half that. The history department's collection of several hundred slides soon burgeoned to 55,000, and today nearly two thirds of the 26 members of the department routinely bring slides and films into class. The collection, in fact, has grown too fast for one work-study student to catalog (nearly 20,000 slides, filed according to source, await indexing according to subject). The collection is used regularly not only by the history faculty but also by teachers in Delaware's College of Education and College of Business and Economics.

The Media Center houses slide projectors, program mixers (which mechanically coordinate multiple slide projectors), tape recorders, tape-recording mixers, turntables, headsets, cameras, and film developing equipment. A few faculty members occasionally combine all these tools to create multimedia programs for use in their lectures. But this is done sparingly, first because such programs invariably take a great deal more effort to assemble than is ever anticipated, and second because professors soon realize that overuse of media yields diminishing returns.

Slides can be a splendid way to relieve the droning monotony of lectures, notes associate professor and Jacksonian scholar James C. Curtis, "but you can't go in there and turn on media and expect it to perform miracles." However, in traditional lecture courses, Curtis feels a student can easily read everything a professor might say in his lectures; he sometimes prefers, then, to let his students independently read selected texts (which he would normally summarize in a lecture) while he uses slides in class as additional amplification.

But Curtis acknowledges that photographs pose serious problems for the careful historian. No one has yet learned precisely how to look at a photograph. One does not instinctively ask oneself, for instance, Who took this picture? When was it taken? What were the circumstances? How was the original negative cropped? If part of the picture has been left out, what was left out and why? How candidly was the picture taken? How much of the photograph was deliberately composed? And if arrangement took place, who posed it and why?

Such questions and the lack of a systematic approach to answering them may help explain why there are

Learning experience:
History Through Media, open to all graduate and undergraduate students, enrollment: 20.

Other descriptions:
The History Teacher: "Teaching with Audiovisuals," February 1973; "Learning History Through Media: An Experimental Approach," August 1973; and "Historians and Film: Some Problems and Prospects," August 1973. *Multimedia and History*, a manual available through the University of Delaware Media Center.

Where replicated:
University of Maine at Orono.

Contact:
James C. Curtis, Department of History, University of Delaware, Newark, Delaware 19711; (302) 738-2678.

HENRY WEIL is a free-lance writer based in New York City. He was an assistant professor at Union College in New York where he headed the drama program.

immense photographic archives in this country almost totally untouched by historians. These begin with the National Archives in Washington and include many state and local historical societies. Such troves of unpublished primary source material have long fascinated Curtis. So in the spring of 1971—his first year at Delaware—Curtis combined this fascination with a desire to explore methods of teaching beyond the traditional fountain-sponge, teacher-student relationship in a course he called History Through Media.

The course demands that its students undertake original archival (or other primary source) research and report their findings in a multimedia presentation. Such presentations typically use several slide projectors (to allow for multiple images as well as cuts and cross-fades), accompanied by a taped narration and musical sound track. The course requires these presentations to be historically accurate, technically competent, and, insofar as possible, originally interpretive. "If the term paper is valid," insists Curtis, "why not a videotape or slide presentation? I reject the theory that says, If it doesn't have a footnote, it can't be serious."

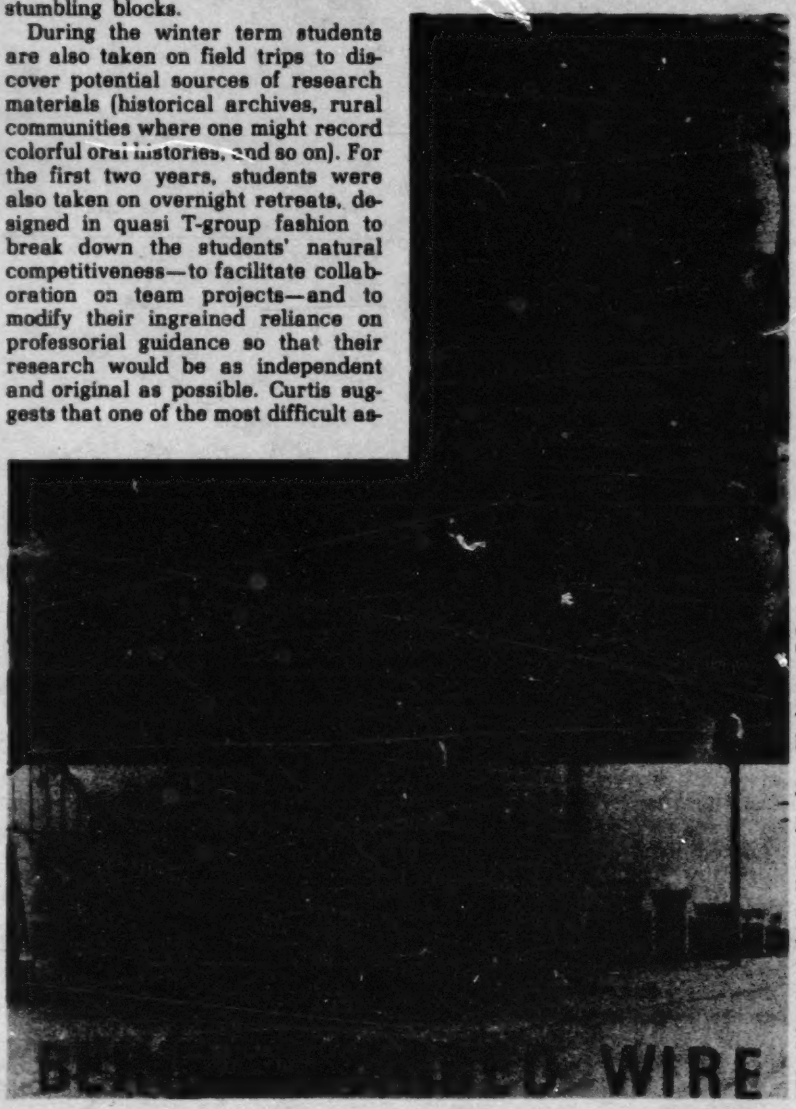
History Through Media is a nine-credit course. Three credits are taken during a 5-week winter semester (when students may, if they choose, take only one course), and the remaining 6 credits are taken during Delaware's 12-week spring semester. (Students at Delaware normally take 15 credits per semester—typically 3 per course—and faculty members customarily teach 12.) Curtis always teaches the course with a faculty member from another department if possible. At the moment, Curtis teaches History Through Media with assistant professor Robert D. Bethke, coordinator of the folklore program in Delaware's English department. Because of this interdisciplinary arrangement, students may apply six of their credits either to history or to English, with the remaining three credits going to the other discipline. (The course is also taught, complete, in five weeks over the summer, usually to graduate students and to working history teachers who wish to acquire Curtis's techniques.)

Since the course takes up a large portion of a student's course options, not many students seek admission, rarely more than 50. Curtis and Bethke limit annual enrollment to 20, and the only criterion for admission, says Curtis, is the answer to the question, Is this student really willing to work his tail off?

The winter session of the course drills the student in media technology: recording, overdubbing, photography, developing, mounting slides, and the process of copying a photo negative directly onto another negative to make a positive transparency. Students prepare a 36-slide sample presentation, which presumably eliminates all technological stumbling blocks.

During the winter term students are also taken on field trips to discover potential sources of research materials (historical archives, rural communities where one might record colorful oral histories, and so on). For the first two years, students were also taken on overnight retreats, designed in quasi T-group fashion to break down the students' natural competitiveness—to facilitate collaboration on team projects—and to modify their ingrained reliance on professorial guidance so that their research would be as independent and original as possible. Curtis suggests that one of the most difficult aspects of teaching the course is learning to let the students go, to respect their natural intelligence, and to let them learn on their own without constant intrusion. Since 1972, however, overnight retreats have been abandoned. Curtis now feels that one-day field trips accomplish just as much.

Students tackle their projects as teams primarily because there is simply not enough time available for Curtis and Bethke to supervise 20 individual projects. Their self-imposed limits on intrusion, of course, cease when a project shows signs of languor. To date the largest team has included seven students, the smallest

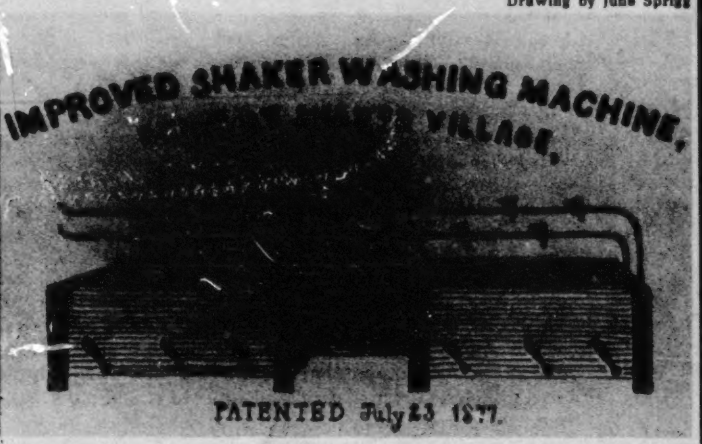


War Relocation Authority, National Archives, Washington, D.C.

From the media presentation "Behind Barbed Wire."

Shaker Village, Canterbury, New Hampshire

Drawing by June Spriggs



From "The Gift To Be Simple," a presentation on Shaker life.

three. Teams are free to work on any project they choose, provided only that there are adequate visual research materials available. Past teams have been steered toward the National Archives' masses of photographic material covering such subjects as sharecropping in the South, the Nuremberg Trials, and Matthew Brady's complete collection of Civil War photographs. But students seldom require steering. Many sign up for the course already full of ideas for potential projects. One recurring proposal, which Curtis has always had to veto for lack of sufficient visual material, is organized crime in the 1930s.

During the spring semester, student teams meet with the teaching team at least once a week. All aspects of their projects are examined in these meetings. To insure the integrity of the final project, Curtis and Bethke insist that the mechanics of presentation be kept simple (the most complicated project so far has used three simultaneous images, which requires six projectors). Further, after a preliminary survey of the source material available, Curtis and Bethke insist that no further work be done until the script is in respectable shape, intellectually as well as historically. "The script conferences," says Curtis, "are the longest, the most difficult, and the most truly cooperative sessions we have."

The scripts are typically too long at first. Curtis and Bethke try to keep all presentations under 30 minutes. While Curtis is constantly struck by the sense of student cooperation in these projects (there are few personality conflicts), he does recognize that whenever one team member dominates a group, that student tends to be the script writer. In the final analysis, says Curtis, "script conferences are really the heart of the course."

But it would be inaccurate to conclude that the students are only producing illustrated term papers. What is remarkable about the best of the projects is that the students have discovered the potential emotional impact in visual images and have learned that a series of them can be arranged to create an experience wholly unlike reading an essay. Curtis explains that the best efforts have been remarkably "interpretive." But even that word fails to identify what it is that his best students have learned. When photographs accompanied by music are all drawn from a historical incident or condition, an arrangement of them is uniquely capable of conveying the humanistic passions that lie behind the circumstances. Verbal intellectualizing often has difficulty coming to grips with such matters.

To illustrate: One of the most successful media projects (on which Curtis, uniquely, collaborated) examined artifacts from a dying Shaker community for the sense of religious commitment they expressed. To say, "For the Shakers, form followed function," is not so forcefully expressive as seeing photographs of Shaker life interspersed with pictures of selected Shaker-produced utensils, accompanied by Shaker-composed music, and narrated with basic tenets of Shaker philosophy. To experience the project is to come to a profound understanding of the Shaker world view.

Or again: Curtis's students produced a project on the internment of Japanese-Americans during World War II. To merely state, as a term paper might, that Japanese families were forced to live side by side in open dormitories and to eat in hangarlike mess halls would lack the force of showing—through photographs of endless rows of steel cots and square wooden toilet seats—how Japanese families were deprived of dignity and privacy.

The danger inherent in photographic assemblages, of course, is that they can easily become indiscriminately sentimental. But the success of History Through Media is that it probes the sentimentality and irrational emotionalism of recent history until it is absorbed by the students and translated into public expression. There are times when emotional motivations are more germane than all the dispassionate reasoning in a university library, and at its best, it is just such human perspectives that History Through Media encourages.

Students are graded on the amount of work put into a project and so far no one who has taken the course has flunked it. Curtis bears down on those whose efforts slacken, but he claims this seldom happens. Students are required to display their projects publicly to the university community at the end of the spring semester and the anticipation of public scrutiny apparently goads students to extra effort. They know their projects will not be simply filed away like a typical term paper.

Students tend to measure their own work against that of media professionals, and appear to care only for

Shaker Village, Canterbury, New Hampshire

the success of their projects. "Student concern for grades has been less a factor here than in any other course I've ever done," says Curtis. Moreover, historical material seems to be absorbed much more permanently through these projects than through rote memorization. In addition, of course, students learn how media materials may be manipulated. Says Bethke: "They'll never watch Charles Kuralt with the same eye again."

All this is not to say that student projects are universally successful. One project with a splendid script probing the causes behind the Philippine insurrection at the turn of the century lacked sufficient illustrative photographs, with the result that images and text often clashed, each detracting from the other. In another project, the course's sole experience with videotape, an obscure bluegrass band was photographed, and all the musicians were interviewed. Each was asked how he got into the band, what influenced his style, how he felt he typified bluegrass traditions, and what the source was of the particular instrument he played. Both music and narration were thus of particular interest and value. But the students decided to display music and narration simultaneously, which prevented the viewer from concentrating fully on either, ultimately lessening the value of each.

Nevertheless, as an approach to history, the course seems to be breaking important new ground. James W. Moore, director of the Audio-Visual Archives Division of the National Archives, where most of Delaware's projects are researched, claims that while publishers comb the archives frequently for book illustrations, there is little scholarly research undertaken in its collections. "We're interested in seeing our collections used as evidence as opposed to embellishment," says Moore, and he describes the Archives' relationship with Delaware as "very close and very good."

Until recently, the operating costs of History Through Media were borne by the university, which gave the Media Center approximately $1,000 a year, only a portion of which, however, could go specifically to the media course. From January 1975 through December 1976, Delaware's several media courses are operating on an additional $35,000 grant from the National Endowment for the Humanities (NEH), intended specifically to cover the cost of exploring archival material. This money is buying the services of a Media Center assistant, film, processing, blank audio- and videotape, and historical 16 millimeter film footage (i.e., newsreels).

The money is also paying for travel costs incurred by students, which Curtis feels ought to be subsidized. Not including travel, student projects generally cost between $100 and $150 each. Until the NEH grant, students paid for their own transportation and lodging, if any. When the grant runs out, they will probably have to do so again.

Among the byproducts of the course is a manual, *Multimedia and History*, written by the Media Center's technical assistant, Steven E. Schoenherr. It describes in detail the operation and coordination of all equipment used in the course and is sold to anyone requesting it at the cost of printing (about $2). One professor at the University of Maine, teaching a course patterned after Delaware's, regularly orders manuals for each of his students.

Another striking byproduct of the course is a kind of academic rejuvenation of the students. Despite the burden imposed by the course, all students contacted suggested that none of their work in other courses suffered, that in many instances it actually improved. One student, carrying an abnormally heavy 18 credits last spring, commented, "It was my best semester ever." Moreover, no student has ever dropped the course once the spring semester has started. Comments Media Center Director Willard Fletcher, "At the University of Delaware, where students may drop a course practically up to the final exam, that record is exceptional."

And finally, the most successful student projects have achieved recognition outside the university. *Behind Barbed Wire*, for example, the report completed in 1972 on Japanese-American internment, was shown at the National Archives in Boston and throughout California, sponsored by that state's historical society.

The administration's appreciation of the Media Center's work was recently expressed in the form of a grant "in excess of $20,000" from the University of Delaware Foundation (a privately endowed institution supporting research at the university) to expand the history department's slide bank in European, Asian, American, and Latin-American history (the faculty does not now include an African historian). Moreover, this spring the Media Center will move into a new building with space for 150,000 slides, and virtually every facility the center's staff could anticipate requiring, including a complex of classrooms equipped specifically for media presentations.

Still, Delaware's administration remains cautious. When the NEH money runs out, there is no indication that the university will continue that level of funding. Nor is there any clear commitment to maintain staffing of the Media Center beyond a secretary. Thus, it is conceivable that as the center's activities grow, its staff could shrink.

There is even more caution regarding the validity of media research in history. No student has yet been allowed to submit a media presentation as a thesis or dissertation, though this has been discussed. It appears that despite the integrity displayed by Delaware's media historians, there are still mountains to be moved. ■

An old-fashioned, crowded history survey, taught by senior faculty and specially selected doctoral candidates, is giving traditionalism a good name.

"Son of Super Civ"

by James Real

In the late 1960s after a fractious three-year Study of Education at Stanford, the university dismantled the elaborate system of educational requirements for Stanford students and, as President Richard Lyman observed, "put nothing very coherent or constructive in its place."

One of the more prominent victims of this academic pogrom was "History of Western Civilization," a course that had required the attendance of every Stanford freshman for over 30 years. It was reduced to a sparsely attended elective, and some 20 of its full-time instructors were phased out.

The abolition of the course was remarkable for at least one major reason: It was one of those rarities, a required freshman course that was genuinely popular with the students. A survey of upperclassmen two years after its demise asked what had been their favorite course up to that time in their academic careers. Over 80 percent of them nominated Western Civ. A good part of this response might be credited to the political views of those who had been on campus at the time of the ruckus, but a questionnaire asking the same question was later sent to a large group of Stanford alumni. The response was similar: Western Civ was the most valuable and memorable course most of them had taken.

The impact of the loss of a required freshman history survey was quickly felt by faculty teaching advanced courses in both history and the humanities. They found, for one, that a good deal of their time now had to go to remedial teaching. Later, some natural and social scientists began to question the validity of awarding BAs to people who are not at all sure whether the Greeks came before the Romans or, as one professor put it, "think the Iron Age is a magazine published by the steel industry."

This uncomfortable hiatus lasted five years, with the history faculty trying continuously to devise a satisfactory replacement. When consensus was finally reached, permitting establishment of an elective, three-quarter sequence with the exotic title "History 1, 2, and 3," it included a number of significant provisions. Propelled by Quintillian's remark that "those who are unwilling or unable to teach on the beginners' level are not worthy of the name 'teacher' at all," faculty agreed that the freshman course should be taught by senior professors.

Since it was generally recognized that the old western civilization course covered too extensive a period—"everything from Adam to Truman," it was often remarked—the new course was divided into three segments, spanning the Renaissance to the present. And because the budget would not permit the hiring of enough full-time instructors, it was decided to recruit the best doctoral candidates from everywhere in the country to become Stanford fellows, teaching half time and working during the remaining time to complete their degrees.

When what is officially called "Modern Europe I, II, and III" opened for enrollment in 1973, these provisions had been effected. The course was and is being taught by the department's most able and distinguished professors. "Modern Europe I: From the Renaissance to the Enlightenment" is taught by Lewis W. Spitz, William R. Kenan Professor of History and associate dean of humanities and sciences. "Modern Europe II: Enlightened Despotism, Revolution, and the Age of Power and Progress" is taught by Gordon A. Craig, J. E. Wallace Sterling Professor of Humanities and former chairman of the history department. The third quarter, "Modern Europe III: The Twentieth Century," is taught by Gordon Wright, William A. Bonsall Professor of French History and former president of the American Historical Association.

The teaching and research fellows were recruited by advertisements in the bulletin of the American Historical Association. Over 100 candidates applied. Of these, the department chose five that first year to teach the course sections. (There are now 10, about half of whom have achieved the PhD.)

The limited span of history covered by the course was chosen because it was felt that the Renaissance marked the birth of modern times—and that the beginning of the scientific revolution through modern Europe's political and social changes was a period of time students could relate to their own societies and problems. The formula seems to be working well. In 1973, about 200 students signed up for the course; the next year it drew some 430; this year's enrollment approaches 500, which, given the limitations of staff and facilities, is close to saturation.

So about one third of Stanford's freshmen are now taking what someone dubbed "Son of Super Civ." In

Learning experience:
Modern Europe I, II, III; no prerequisite, enrollment: 500.

Other descriptions:
"History Comes Back," *History Exchange* (published by the Xerox Corporation), Fall 1974; American Historical Association *Newsletter*, December 1974.

Contact:
Carolyn C. Lougee, Department of History, Stanford University, Stanford, California 94305; (415) 497-3329.

JAMES REAL is a journalist-author based in California.

addition, the course is being infiltrated by upperclassmen: 46 sophomores and 24 juniors were enrolled in the fall 1975 quarter. "To have 500 is unwieldy enough," says Spitz. "If you get 1,000, the thing turns into a Shakespearean performance." He pauses. "Still, I keep thinking about the 500 kids going into prelaw or premed without the slightest notion of who Pericles was or, for that matter, much of anything that happened before 1950."

Expanding the freshman history course would indeed require solving some imposing problems. The offices and discussion rooms are warrens tucked into a maze called History Corner in the oldest usable building on campus, a weird stone pile built in the early 1900s. Parts of the building were condemned after a ceiling collapsed in a classroom. Consequently, all of the lectures by the senior professors have to be given in two sections. These are often staged at 8 a.m. and again at 9 a.m. That lectures are jammed at those hours says much about the popularity of the course. On occasion, the modern auditorium in the Graduate School of Business building must be borrowed to accommodate the crowds.

As everyone in higher education knows, it is one thing to produce large audiences for erudite, attractive professors and quite another to design a cohesive program that will effectively teach. In the case of the Stanford freshman course, two other coordinated factors are essential to its apparent success. First there is a common reading list for the students—a requirement that did not always exist in the old course. The list ranges from *The Prince* to modern novels like *Darkness at Noon* and *The Plague*. There are about 40 titles, but many are only sampled through two or three chapter assignments.

Second, the work of the fellows in their sections is vital. Each of the 10 teaching fellows conducts three two-hour seminars each week for an average of 50 students in segments of about 16. Although the fellows are privately engaged in a variety of historical specialties—modern Germany, British labor, and so on—section discussions are based strictly on both the assigned common reading and the three weekly lectures by the professors (also synchronized with the readings). An important prerequisite to the award of a teaching and research fellowship is that the applicant have graduate preparation in the whole sweep of European history.

It is not possible to get through this course by simply attending the lectures. Examinations are based on the material discussed in the sections. When time comes to draft the exams, the fellows meet with the lecturer and hammer out a final paper that becomes the examination for all the students. Aside from the academic inducements to show up for these sections, the sessions are generally sprightly affairs, loud and challenging, and more than a little fun. Some are held in dormitories and campus residences where "everyone knows everyone else and isn't afraid of speaking up and maybe making an ass of himself."

Both the senior faculty and the students give major credit for the success of the course to the fellows. Criticism of the old method for handling the 1,000 or so freshmen usually includes remarks about the competence of the teaching assistants. "They just didn't know enough," says a current fellow who took Western Civ. (Few of the teaching and research fellows, incidentally, are Stanford alumni; most of the successful applicants, in fact, have been educated outside of California.)

Son of Super Civ is not heavily populated by students who intend to become history majors. After a lively lecture by Spitz on the origins of modern science, one premed student explained to me why he was taking the course: "Look, this is all the so-called culture I'm going to get. I've got to get into medicine. My old man is a surgeon in L.A. All he knows about is cutting people in approximately the right places and how the NFL is making out. And today Spitz tells me Harvey was hung up on the circulation of the capillaries until someone invented the microscope. And a whole lot of other things I didn't know I wanted to know. Maybe I'll get out of med school only half a dummy."

Modern Europe I, II, and III is not designed to promote history majors although it seems to be doing just that in a modest way. The graduate school quota has been cut back by 60 percent, and only about 20 new graduate students are admitted each year. Wright blames the job market. "We just don't want to train people we can't place," he says.

The emphasis of the tightly coordinated course is upon social, political, and cultural pasts, and how those pasts, for better or worse, have affected the present and will affect the future. The rubric "history," according to the designers of the program, is a vehicle meant to apply only to a vast continuum, an understanding of which is indispensable to any person who hopes to have even the most modest effect on modern society's arts, sciences, religion, politics, and ethics.

Spitz has put it this way: "At the moment a wave of professionalism is sweeping across the campus with thousands of premeds already clutching at test tubes and microscopes as ingenuous freshmen. Universities tend to mirror the society around them and ours is a society suffering from amnesia, drifting along in a state of mind that Kierkegaard once referred to as 'a kind of world historical forgetfulness.' But the loss of history, the collective memory of mankind, means a loss of identity.... Restoring history to its rightful place in the university is more than a self-serving cause. It is essential for our society and desperately needed for our civilization."

Each of the professors denies that the course is in any way innovative. Of course there are evening movies—four each quarter—which are not very well attended. But apart from the films, the course is taught much as it would have been taught 30 years ago: a stand-up lecture by the distinguished professor, a rough and extensive reading list, and smallish supplementary discussion groups. But there are differences, even if not touted as innovations. The professors are devoted to the necessity of intercepting the young before they go on to their

> ***"The decisive difference here is between merely 'doing well' at this level and by contrast 'giving it all you've got.' The shift from the former to the latter can really turn things around in terms of actual effectiveness of teaching...."***
>
> ***Paul L. Ward***
> ***Executive Secretary Emeritus***
> ***American Historical Association***

lofty trade schools. The fellows are the best Stanford can find and young enough that freshmen can identify with them.

While no outside lecturers participate in the freshman course (Craig, Wright, and Spitz carry the entire sequence), the interdisciplinary activities of the history department are widespread and vigorous. For example, in spring and summer 1976 Spitz will also be teaching the Age of the Renaissance for undergraduates with Lawrence V. Ryan of the English department and Kurt Forster of art history. "We'll run it through the fourteenth century into the 1600s," says Spitz. "The three of us will meet weekly to avoid duplication. I can build up Ryan or Ryan can build up Forster."

The influence of the Department of History is felt throughout the 15 departments that make up the Division of Sciences and Humanities. The argument advanced by all faculty in the department is that history is indispensable to a balanced, structured education, no matter where a student is headed. All of them endorse Craig's insistence that history gives "philosophical balance to the thinking of the lawyer and the physician." "Shouldn't a good lawyer," he asks, "know something about the historical political processes in countries other than his own?"

One of Spitz's close associates in the effort to smuggle a bit of history into the head of the specialist student is David Halliburton, who, in addition to his duties as professor of English, modern thought and literature, and comparative literature, is director of the Center for Teaching and Learning, funded by the Danforth Foundation. The center was established to help improve teaching and learning techniques in the many Bay Area colleges and universities and it offers intensive two-week workshops during the summers. One of the first of these very popular live-in sessions featured a workshop on the teaching of mathematics and one on the teaching of history. The two groups were brought together to explore interdisciplinary possibilities for curricular change.

But the passionate commitment of the faculty and fellows continues to focus on freshman history. When asked why such intense concentration on freshmen, Craig replies: "You're working in the most exciting period of young people's lives, when they're making that transition from school to college, when they're most open to new ideas, and when you can make a profound imprint on their total education. You can give them standards and ideals. You can show them how to put things together. This is the time you need great teachers who can grab them. The young have spirit and openness at this time. It's a shame that in many places they come into courses with all that energy and those high expectations only to find the material dull and, too often, the instructors themselves not very interested.

"There's no reason why you can't make up a marvelous history course any time you want to. Only a great number of people don't. And they don't because sometimes they try to be too scientific. They put on white coats and say somberly, 'We really have to look at history in different ways,' or 'Let's analyze the facts so that we're sure that we're replicating what really happened.' These things have their place. Quantitative history is a very important tool for the historian. But it's not for freshmen."

From what one can tell, the students' response to the course is almost as enthusiastic as the faculty and fellows would lead one to believe. I was at Stanford during Spitz's quarter. His lectures were given in the business school auditorium and were attended by about 250 students. There was little of the squirming and murmuring that mark so many large, early morning lecture courses. Of course, Spitz is an outstanding teacher. But it was the content of the lecture rather than its delivery that seemed to hold the quiet attention of the audience. Spitz skillfully wove the great scientific discoveries of the seventeenth century with the religious prejudices of the French Academy and the British Royal Society, spicing his presentation with tales of simultaneous discoveries and inventions, and with such gratuitous novelties as the assertion that 90 percent of Newton's writings were theological.

For all of the enthusiasm and at least surface approbation, the large volunteer freshman history course is hardly set in concrete. An interdepartmental committee, of which Spitz is a member (but which includes neither Craig nor Wright), has drafted a far-reaching proposal that, if adopted, would supersede the elective history course. It proposes to offer five courses or "tracks," two of which would be operated by the history department in conjunction with the classics department, the other three being the responsibility of the humanities division—probably in combination with the English department. One of these tracks would be religion and philosophy, and two would be a combination of languages and humanities. All five would cover the entire span of recorded human history, with a common reading list—or as Spitz puts it, "a sort of great books list." The principal novelty of the plan is that each freshman would be required to take one of these western culture tracks.

None of this sits at all well with Wright and Craig. Wright calls the proposed change "a major swing of the pendulum, a reversion to a rigid undergraduate curriculum, an attempt to undo what was done here in the late sixties." Craig is reported to have said he would "fight to the death" in defense of Modern Europe I, II, and III. But since he will spend much of his leave at Stanford-in-Berlin, it will have to be a rather long-range war. In our discussion he was philosophical: "I, II, and III are detachable. If some form of old world civilization is reinstalled, II and III will come back—perhaps under different names—in the sophomore sections."

Modern Europe I, II, and III at Stanford is an outstanding set of courses for that one third of the freshman class that elects to take it. But, as well-taught and popular as Son of Super Civ is, a majority of Stanford freshmen sidestep any history. So the old arguments pro and con the reestablishment of a western culture requirement continue. While prominent members of the history faculty talk up the cultural values of history, they are at the same time vehemently opposed to imposing the subject on undergraduates.

But the university's Committee on Reform and Renewal of Undergraduate Education has unanimously endorsed such a requirement. The changes that would divide the western culture structure into five more manageable interdisciplinary courses will be debated for some time and continue to generate considerable heat. ■

Focusing on the skills and knowledge a historian should command, this alternative approach to a BA in history assesses a student's grasp of specific historical understandings.

What a Historian Should Know

by Nancy Pirsig

The history competency project at Sangamon State University started with one basic question: What should a person be able to do with a bachelor's degree in history? Phrased another way: What should history graduates be competent to do? For example, should they be equipped not only to read but also to critically analyze news stories that appear in the daily papers? As many faculty at Sangamon State can attest, the answers to questions like these lead to further questions, such as: What, really, is history? Why should anyone study it? And how do you define an educated person?

The competency program in history began to take shape in 1972 in conversations between several history faculty members at Sangamon State, an upper-division and graduate school in Springfield, Illinois, and an administrative team in Illinois Central College (ICC), a community college 90 miles away whose students often continue their studies at Sangamon. Faculty from those schools (and recently from Sangamon's near neighbor, Lincoln Land Community College) are currently involved in the program. Its director is Christopher Breiseth, professor of history at Sangamon.

"I think we really started this whole thing from a gnawing sense of the inadequacy of our own education, including graduate education," says Breiseth. "It was sobering to some of us holding PhDs from very traditional universities [Breiseth's doctorate is from Cornell] to realize we had never systematically analyzed our profession or attempted to define, with any degree of precision, what an undergraduate should gain from a liberal arts education focused on the study of history. And as we searched the literature, no one around the country seemed to be asking questions quite as presumptuous."

As faculty wrestled with what the study of history should be for the general student, one thing became very clear to Breiseth. "In everyday life situations—like reading a newspaper or listening to a political candidate—we want our graduates to be able to think analytically, recognize assumptions, investigate a complex situation, separate it into its discrete parts, and draw these together into a coherent synthesis, demonstrating an ability to recognize and defend their own assumptions in terms of the evidence."

One task, then, has been to develop an approach to history that will help students integrate their learning and develop the real-life skills Breiseth mentions. To this end, the faculty have settled on three broad, yet intersecting, "historical understandings" or competencies which the student is expected to master: an understanding of the major forces shaping the contemporary world; an understanding of oneself in the contemporary world, as a means to understanding others in a historical perspective; and an understanding of the functions of culture in our own and other societies as they affect institutions, values, and behavior. A fourth competency serves as a necessary tool for the others—the ability to identify, locate, and interpret primary and secondary historical materials.

Students work toward these competencies in a program that requires no specific number of credit hours for graduation but is rather an alternative path toward a BA in history. In an initial semester-long colloquium, students are introduced to faculty members available to help them in planning a self-paced program. Each student chooses from among them a mentor/adviser with whom he or she will work closely. Together they select two or three areas that interest the student most for historical study, and go on to develop specific projects leading to the competencies. A student guide lists some of these activities: In order to gain competency in understanding oneself in relation to different cultures and times, a student might "offer an oral or written summary of three different disciplinary perspectives on the nature of perception or the nature of prejudice... or, demonstrate an awareness of [your] prejudices as they compare with those of others in a controlled role-playing situation...or analyze the historical development and change of at least one prejudice—racial, sexual, ethnic, or class—over a period of 100 years in a chosen nation."

In one such competency project, Scott Brooks-Miller, a Vietnam war veteran greatly interested in Southeast Asia, presented an oral overview of Vietnam in 1908, including impressions of the state of its major cultural institutions at the time, the impact of French colonialism, class structure, demography, and the country's place in Asian politics. Anne Mayberry completed a semester-long project to develop her research skills by working for the American Civil Liberties Union. Students can pursue projects through independent study or field work or through traditional courses, provided their course work leads to the stated understandings.

NANCY PIRSIG recently left her position as assistant director of the Department of University Relations of the University of Minnesota to devote her time to free-lance writing.

To date students have entered the competency-based history program by way of a freshman survey course at ICC called "The Roots of Contemporary History." Team-taught by Breiseth and William Feipel, assistant professor of history at ICC, it draws on current newspaper and magazine articles to illuminate larger issues, with emphasis on the U.S. and the Soviet Union. Students analyzing a news story on the energy crisis, for example, are asked to go back in time to examine the major forces that brought the U.S. to its current situation: forces such as industrialization, nationalism, economic expansionism, anticolonialism. Along with the contemporary sources, students read from four textbooks (Nugent, *Creative History*; Cochran and Miller, *The Age of Enterprise*; Von Laue, *Why Lenin? Why Stalin?*; and Barraclough, *An Introduction to Contemporary History*), comparing the authors' ideas on the forces that shaped history.

Current events orientation is not the only departure from tradition. Students help make up tests to deepen their understanding of what they are supposed to learn and why. During the course they are introduced to the idea of what a historian does and what a competency-based program is. Their skills are assessed and those who choose to enter the history project at Sangamon agree to work on their weaknesses. Thus one young woman who wishes to become a teacher has worked on overcoming shyness and is now comfortable speaking before a group. Brooks-Miller, who had deficiencies in speaking and writing, says the faculty "make me do a paper and give it orally whenever possible." Beginning in 1976 other history students at Sangamon, not just those from the ICC "Roots" course, will be able to enter the program.

By the time their first joint course was over, in the spring of 1974, the faculty had received a grant to pursue an interinstitutional effort to establish a competency-based bachelor of arts degree in history, and the real work began. It became necessary to think about restructuring the history curriculum, or using existing courses to meet competencies; providing learning experiences outside the classroom, including independent study and field work; finding ways to assess competencies; defining "competency credits" and basing a degree on those definitions; deciding what the student's transcript would look like; and grappling with the implications of a time-variable degree which is awarded on the basis of something other than credit hours.

And to this list, some add the need to attract more students into the project. To date there have been just six. Still, the direct results of the program affect many more students than just those who have chosen a competency-based history major. Now all history faculty at Sangamon State emphasize the educational process—how the course content affects the student—rather than subject matter alone. "We care about themes, issues, learning to think rather than strict content memorization," says Nina Adams, assistant professor of history at Sangamon State and last year's co-director of the program. "None of the history courses come on strong with, 'Do you remember the date of such-and-so?' but rather, 'What is the connection between...?' or, 'Compare this to that and give your reasons.'"

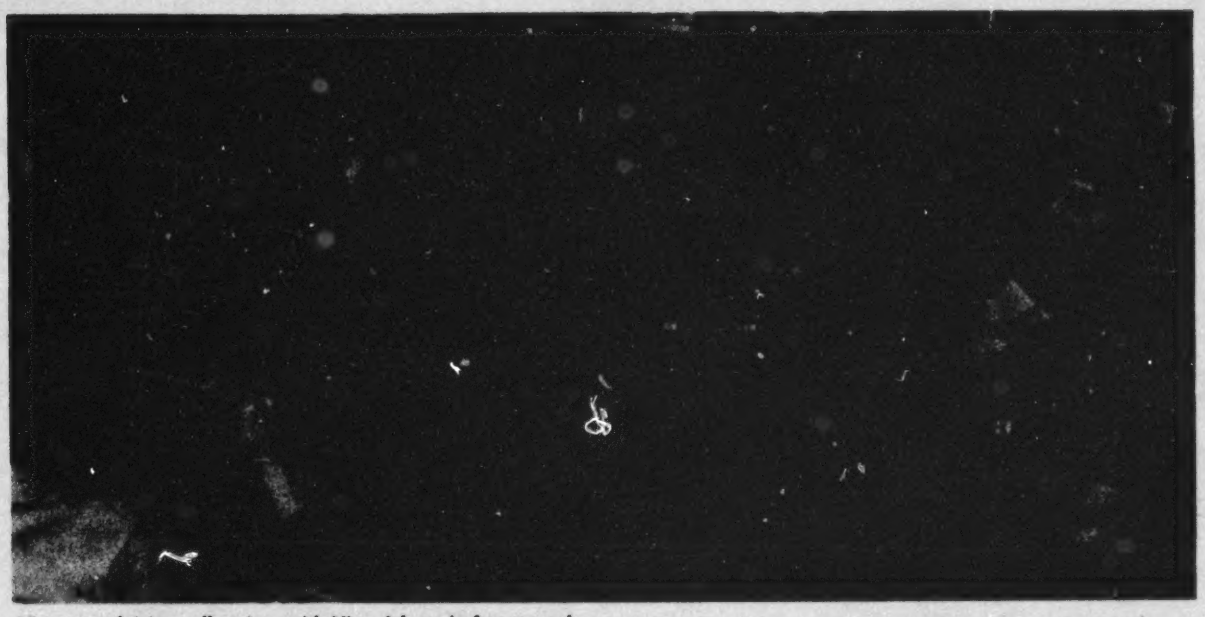
Christopher Breiseth.

According to Adams, the project was conceived to meet the specific needs of students who come to Sangamon State from the community college. "With open admissions for all community college graduates, we found more and more students who did not...know the meaning of, 'Organize. Synthesize. Analyze.' When students have no library experience, it's useless to say, 'Go look up....' We were letting them take a drib of a course here and a drab of a course there and were assuming they had the skill and background to put the whole thing together into some sort of coherent experience that would help them in some way through life. And it just wasn't happening.

"The great attraction for us now," she is quick to point out, "is that it works for all different kinds of students. If you have some who are highly sophisticated and skilled, it gives them a layout of what they can do, what all the possibilities are, right away, and then they just take off like rockets, and that's great."

Other factors may help explain the ethos from which the project developed. First of all, Sangamon is a new institution, begun in 1970, without the heavy hand of tradition inhibiting fresh vision and exciting ideas. Its location in Springfield, capital of Illinois and birthplace of Lincoln, explains both its legislative charge to be a public affairs-oriented school and its attraction to history teachers. One Sangamon faculty member has received funds from the National Endowment for the Humanities for a major program in historic site interpretation involving six Lincoln shrines. The project is intended to "provide visitors with a vivid sense of what life was like here for Lincoln and his contemporaries and to help them better understand the enduring themes of American democracy." Another project operated through Sangamon State is the Clayville Rural Life Center, 12 miles west of Springfield. Clayville is an example of living history as taught at Sangamon: a re-creation of a total environment that involves intense research into the daily life of people in another era.

Both are examples of what Breiseth means when he says, "We have a rich series of activities here. We're not theoreticians." He points to the enviable situation of Sangamon history graduates who get jobs in surrounding communities related to their major—not just as teachers but as archivists, researchers, directors of oral history projects, museum curators and directors, and restorers of historic sites. Students in the Applied Study Term are serving internships in the state legislature, in other state



A history advising colloquium with Nina Adams in foreground.

and federal offices, and even overseas. With such diversified activities already established, developing a competency-based program for history students seems a much more natural task than it might be elsewhere.

Larry Shiner, dean of academic programs, explains, "The real key to competency education is achieving competency in the faculty; getting them to develop the kind of skills they need to help the student achieve competency. We are working on a faculty development plan in which there are two key elements: one, concern with the faculty member as a facilitator of learning who must be able to do things like state objectives—not only for a course but for individual students; and two, [concern with his or her] ability to assess where students are and where they've got to go. Faculty aren't really trained in assessment. They've only learned to give certain kinds of tests and grade certain kinds of papers."

What Shiner singles out as special about a genuine competency project is that "heretofore what we've done is say, 'Put together enough courses in which all these things are going on and you'll get a BA degree, and that in itself says you're competent.' We've never said too clearly what that meant. It could just mean that you're competent at conning professors, or after X hours of courses you're sufficiently socialized to know how to operate in the system. Now if this project or any other really comes up with new ways of assessing competencies without credit collecting, and means it, then we could really have something."

Indeed, one of the knottiest aspects of the program has been setting up a fair procedure for assessment. In the latest plan, the student directs a committee consisting of the mentor, at least one other historian, another student, and additional faculty, if appropriate, to review periodically and approve the student's program and progress and to assign competency credits according to the type of experiences and projects the student wishes to undertake.

In addition, the committee later serves as an evaluator in each of the three broad areas of competency, when a student decides to demonstrate his or her grasp of, for example, "the major forces shaping the contemporary world." The important thing is that the assessment procedure is not simply a transfer of course credits into competency credits, and the degree is not automatically granted in four years (or two years at Sangamon, which is an upper-division school).

One of the original ideas of the project was that students could earn a bachelor's degree in something less than four years. In fact, a leaflet still used at ICC is titled "A BA Degree in 3 Years?" But faculty members have since discovered what Breiseth terms "...the illegitimacy of arbitrarily shortening a student's undergraduate career without conceptual justification. We had to ask why 3 years? Why not 5? Or 10? We decided to stop counting hours and instead to focus on what the student must learn in college, how well, and which evaluative instruments to use in measuring proficiency."

Nina Adams brings up the negative administrative response to a self-paced degree. "There's a certain amount of resistance on the part of the administration when you start to talk about a competency project that is not time-bound. Sooner or later someone will be able to come in, go through some of these assessments in three weeks, and get a BA. People start getting nervous about tuition money and full-time equivalents. We point out that some of the students will take more time instead of less, but they don't really believe that."

Beginning in the fall of 1976, subject to university approval, a student will be able to take a full competency degree in history, receiving competency credits not only in history but for general education competencies as well. At the same time the student will be earning ordinary course credits so at any time he or she may shift back to a straight credit-hour degree. Both types of credits will be entered

on the transcript, along with an explanation of the competencies.

Feipel and Breiseth have worked together since 1973 and have team taught the freshman "Roots" course at ICC every spring. In spite of hindsight enthusiasm for their first course together, they frankly admit that in the beginning they were put off by the difficulties of team teaching when their backgrounds were from two very different institutions with diverse student bodies. "If we hadn't received a grant, we would have dropped the whole thing right then and there." Nor were they helped by what Feipel calls "the traditional snobbery of university professors toward those who labor in the trenches of community colleges.... It's most important that those personal attitudes and relationships be worked out."

Feipel travels to Springfield once a week to take part in discussions over the various decisions still confronting the project. Everyone involved acknowledges the need to end debate on some issues, stop talking and make decisions, get it down in writing. "Reach closure" is the favorite phrase among the faculty. Partly because of the 180-mile round trip, but more because of the type of school he represents, Feipel feels even more strongly about the matter.

"Community colleges tend to be very structured places," he says patiently. "At ICC we've always demanded more concrete, on-paper structure than our more eclectic colleagues at Sangamon, and that's still our goal: to see the student guide and the competencies spelled out on paper. The longer it takes, the more impatient my department chairman and dean of instruction become. Until it happens, there will continue to be some eyebrows raised...." But he smiles as if he knows it's silly to talk about.

The reasons for the slowness, the failure after so much time and energy to reach closure on so many issues (the student guide is still in preparation; the competencies are continually undergoing revision), might serve as warnings to those who would attempt to set up similar programs. "One of the real problems of a project of this kind, so large in nature, is the management aspect," says one faculty member. "Trying to figure out how to get everything done, how to break it into small enough pieces so you can deal with it, how to manage our thinking and decision making has been the most enigmatic and frustrating aspect of the whole thing."

Compounding the difficulties at Sangamon has been the yearly turnover in directors. Just as each one has finally understood the enormity of the undertaking and has moved from where he or she was comfortable—namely with intellectual problems like defining competencies—to where he or she was uncomfortable but saw the need to go—namely into areas like credentialing and assessment--the director has changed. Outside commitments also interfere. In addition to his usual heavy load of committee work, teaching, and student advising, Breiseth is this year's chairman of the faculty senate.

Though he acknowledges that the project makes great demands on his time and energy (much more than the one third released time granted him), Breiseth feels that the careful, time-consuming, democratic process "is essentially a healthy thing."

A by-product of the seemingly endless discussion is the enormous quantity of written material on various aspects of the project which have been criticized not only on grounds of volume but of unintelligibility. "The project suffers from too much planning," is the candid comment of one faculty member, "and the bulk of written material is by and for academics. So much is conceptual, academic jargon that the students can't understand it."

"We tend to come out very badly on paper," Nina Adams admits. "Even though the project is very exciting, when we put things down on paper a very strange thing happens: It looks dull as hell. We all wince. People read our stuff and are totally turned off; they come here and talk to us and to our students and get very turned on." And in spite of all the paper, there is no single document that outlines the project in toto. The closest thing to one encompassing booklet is the student guide—which has been turned over to a graduate student to draft.

All difficulties aside, the project, with its focus on understanding contemporary affairs, does generate excitement and enthusiasm. Art, anthropology, economics, politics, literature, geography—all become relevant, part of the human experience that brought the world to where it is now. Every communication skill becomes a way to relate to one's own community and other cultures. Self-understanding, a novel goal in the study of history, is a stepping stone on the way to cross-cultural understanding.

The students in the project have without doubt been excited by its approach. Anne Mayberry and Scott Brooks-Miller will graduate in spring 1976. Says Mayberry, "I think if I were in a conventional program, I'd try to just get by. But what really makes this place exciting is that you're not learning for someone else, you're learning for yourself."

"I like above all the mastery learning aspect of competency education," says Brooks-Miller. "Given enough time and proper instruction, 95 percent of all students can master the subject...I know I would have had a very difficult time making it through a college in a traditional setting. In fact, I don't think I would have made it." He now is applying for admission to graduate school.

Theresa Tomich, in her first year at Sangamon State, explains that, "Here you have to ask yourself what education is: Do you want a degree for status, or to get a job, or should it have something to do with developing your thought processes? I may be a hard-core idealist, but I can honestly say I'm here to learn." ■

Learning experience:
History Competency Project: an alternative path to a BA in history.

Other descriptions:
"Competency and Cooperation: A Pilot Program in History," *Community College Frontiers*, Spring 1974. "A Student's Guide to Competence in History," available through the history department at Sangamon State University.

Similar programs:
Governors State University, Park Forest, Illinois, has received a grant to create a competency-based liberal arts program.

Contact:
Christopher N. Breiseth, Department of History, Sangamon State University, Shepherd Road, Springfield, Illinois 62708; (217) 786-6778.

Through painstakingly developed multimedia shows, a professor restores the emotional content to history without compromising its intellectual core.

The Human Dimension of History

by William Trombley

In a darkened lecture hall on the University of California's Riverside campus, slides of notorious Mexican bandits of the 1850s, 1860s, and 1870s flashed on the screen—Joaquin Murieta, Tiburcio Vasquez, half a dozen others. A narrator, reading mostly from documents of the period, describes the seizure of the large Mexican land holdings in California by Anglo farmers and the rough treatment accorded Mexicans who protested these land grabs. He tells the story of Joaquin Murieta, whose gold mining claim was stolen from him and whose wife was raped and murdered when he protested, and how Murieta then swore revenge and became the most feared of the Mexican bandits. In the background music is heard—a Latin mass that was sung in California missions at the time.

Thus begins "The Social Bandit," one of about 15 multimedia programs Robert V. Hine has prepared for his courses in the history of the American West and the history of California at UC Riverside. His courses are some of the most popular offered by the history department—partly because Hine is a well-qualified scholar who conveys his information successfully to students and partly because of the multimedia shows and other visual presentations he uses to supplement lectures and readings. Hine discussed how "The Social Bandit" fits into his course on California history: "It comes after the study of the California conquest—Fremont, the Spaniards, and so on. We have gotten into the Gold Rush and the nature of Anglo settlements.... The students have read reports of the U.S. Land Commission. They have studied the problems of who gets the land—small Anglo farmers taking over large Mexican land holdings, and other acts of repression against Mexicans. Then you come to the response of the Mexican people. It isn't enough just to say they reacted emotionally. If you only say that a lot of bandits were created, you're not doing a satisfactory job. You need to point out the emotional content of the whole experience."

This is what Hine seeks in all his multimedia shows—an emotional dimension in the teaching of history that cannot be obtained through lectures and reading. "I think of a lecture as a carefully reasoned examination of an important question, when the professor is telling you what he has concluded after some considerable thought and analysis," he said. For example, in discussing the role of religion on the American frontier, "the traditional thing to say is that lives were hemmed in by isolation on the frontier, that rural populations were widely dispersed, and one response was the camp meeting, the religious meeting. You can say that in a lecture, but it doesn't really com-

This slide of Von Schmidt's painting "Sidewalk Brawl" is part of "The Social Bandit."

WILLIAM TROMBLEY covered higher education for the Los Angeles Times from 1965 through 1974. He is presently a general assignment reporter for the paper.

2

MUSIC	LEFT SCREEN	NARRATION	RIGHT SCREEN
SC812		There are no People on the continent of	V129
	ky-1	America . . . more miserable in condition	
		or deplorable in morals than the mongrel	
	H176A	race (Mexicans) . . . . the first things . .	BH54
		(a) traveller (sees) on entering a Mexican	
	Mx30	settlement, is the swarming mud walls that	MX59
		form the rude hovels . . .	
		A few rags, tattered blankets, or old	
	BH29	robes, furnish beds for (the) inmates,	BH39
		who, at nightfall stow themselves away	
		promiscuously upon the ground . . . . and	
	BH21	evacuate their rounds despite the swarms of	
		noxious vermin that infest them . . .	
		Superstition and bigotry are universal,	Mx83
		. . . tied . . . to the disgusting formalities	
		of a (senseless) religion . . .	
		During the Winter months these filthy	Mx15
		wretches are seen, day after day, basking	
		at the sunny side of their huts . . .	
		. .(These Mexicans) must be held in	
	BH63	constant restraint, and kept in their place	BLACK
		by force.	

Sage, Ruffin, Scenes in the Rocky Mts. & Letters & Papers from Weber, Prisoners p.p 77 78.

8 seconds

An old Pinkerton poster of a holdup man and this script fragment are from "The Social Bandit."

municate that sense of isolation. But with slides you can convey feelings of isolation and great distance. When you combine them with letters and diaries of the time, it becomes a very emotional experience."

The shows are not expensive. Most have been produced for about $200, though this does not include the time of the undergraduate and graduate students who do much of the work nor the use of campus audiovisual equipment. This consists of four slide projectors, a tape recorder, two "lap dissolve" machines, and a "programmer," which integrates the slides, music, and narration. This equipment is commonly found on college campuses, even in high schools.

What distinguishes the Hine multimedia shows from many other audiovisual efforts is that they do more then just illustrate specific lecture points. Much careful work goes into preparation of the script, which is the foundation for each show. "The historical principles are sound," Hine said. "You immerse yourself in the materials. You become convinced of what you want to say; you know your point of view before you start on your script. Then you decide what you want to show that you can't do in lectures and readings."

Many of the shows have been developed by students as part of a course. For instance, a presentation about American communes, past and present, was built around an undergraduate course Hine taught on Communitarianism in America. After Hine and the students agreed on key topics—work, sex and marriage, authority and structure, religion—groups of students worked on each of these themes, drawing material from one historical and one present-day commune.

"The Social Bandit" began as a project in a graduate seminar and was completed by Hine the following summer with assistance from one graduate student and one undergraduate. In all cases, Hine said, "I've been instrumental in guiding them to topics I think should be done."

The preparation of a show can take as long as a year and can be, in Hine's opinion, every bit as rigorous an intellectual exercise as the writing of a major paper. Last year two students in his American West course proposed a multimedia show about women. "When they started out they were going to deal with everything from farm women to prostitutes, but that proved to be far too wide a subject," Hine said. "They read for several months and finally decided to do just farm women, at the point they go out to the prairie and face isolation. There we had hit real emotion...but even this much smaller project was almost too much. There was such a huge literature."

Hine insists that students use original sources as much as possible, disapproving of the didactic narrations that accompany many audiovisual presentations. Once the script has been written, the search for slides begins—in museum collections and lists, major books and periodicals, and occasionally among living sub-

jects. Two students who were preparing a show on the Chinese experience in California received a $1,000 grant from a special University of California fund for improvements in undergraduate instruction. They visited San Francisco, where they copied old Chinese photographs and paintings and took pictures of Chinese families still living in small towns along the banks of the Sacramento River.

After the slides have been selected they must be mounted—a painstaking task performed by students. Then music is selected—sometimes folk music from the Library of Congress or other collections, sometimes more contemporary work.

Student response to the presentations has been enthusiastic. The Chinese show "really brought racism alive," said a senior, Cheryl Avriette. "In a way, I almost felt guilty about being an Anglo." Asked to evaluate the American West course in winter 1975, 36 students said the multimedia presentations "added to (their) knowledge or understanding of the material, beyond what might otherwise have been learned solely through lectures and readings." Only three students expressed negative reactions to the shows, while two had mixed feelings.

Hine's courses consistently attract 70 to 80 upper-division students, about half of whom are not history majors, at a time when history enrollments at UC Riverside, as elsewhere, are dipping. A lower-division Western Civilization requirement was eliminated in the late 1960s. The department has dropped from a high of 296 majors in fall 1970 to 137 in fall 1975. The teaching staff has been reduced from 23 to 16 in recent years. Hine readily admits that the multimedia shows are in part a response to this declining student interest. "The thing that bothers you most is the feeling that history is dispensable, that psychology or sociology is more relevant," he said. "You might look at this as one man's effort to cope with this 'crisis.'"

At first, faculty reaction was mixed, according to Edwin Gaustad, history department chairman. "There was some concern that this might be a kind of show-and-tell program of entertainment," he said. But when colleagues realized how much serious academic work went into production of the shows, opposition faded. "There is an enormous educational value" in getting students involved in working on the shows, Gaustad said. "I am convinced this has had great value to our graduate students as future teachers."

Hine, who is 54 years old and has been teaching at UC Riverside since the campus opened 20 years ago, strayed into his field of academic specialization by accident. The first Riverside catalog announced a course in the history of the American West but no one on the staff was qualified to teach the subject. Hine was a new instructor, fresh from the Yale Graduate School and a two-year fellowship at the Huntington Library, where he had completed a book based on his PhD dissertation—*California's Utopian Colonies*, a study of early communal settlements in the state. "The mention of California in the title of my dissertation was the closest anyone came to western history, so I was picked to teach the course," he recalled.

Hine has since written several books and many articles in the field of western history. In 1967 he received the Danforth Foundation's Harbison Award for distinguished undergraduate teaching. Almost blinded in recent years by the aftermath of rheumatoid arthritis suffered in his teens and no longer able to read, Hine now absorbs information through talking books and student readers and does his writing on a braille typewriter. Nevertheless, he is planning a new book, with the aid of a grant from the National Endowment for the Humanities, about the impact of the frontier on the American sense of community.

Hine's work with audiovisual material began in the usual way—with the use of slides to illustrate lecture points. When discussing the fur trade, for example, he would show slides of paintings by Alfred Jacob Miller, a skillful artist who wandered among the Indians and the traders. Later he employed the slides as a form of subliminal learning. "Rather than illustrating the lecture, they make a different statement, either supplementary, contradictory, or emotional," he wrote in a memo on

A. J. Kalbeck

Robert Hine coordinates a multimedia presentation.

the subject. "They may underscore transitions and geographical changes, as when the subject moves from the frontiers of New Spain in the arid Southwest to the frontiers of New France along the lakes and rivers of eastern Canada. The lecturer is thereby relieved of the statement that the two peoples met different geographical frontiers and so devised different responses.

"The visual material will also add depth to the lecture; for example, the slides might explore the destruction of the buffalo, a familiar subject, while the lecture evaluates the early near extermination of the beaver. While the lecture pursues the price of wheat as a factor in the revolt of the farmer, the slides may demonstrate the oppressive, spiritual quality of endless horizons and isolation in the lives of women and children."

A few students have complained that the slides are a distraction, but Hine disagrees. "In the best of lectures, student minds will wander, but the slide commentary works toward containment," he said. "Rather than wandering away from the subject, they may be caught on a related idea, and thus can move back and forth from lecture to screen in an involved fashion, sometimes grasping both at once, sometimes one or the other, but hopefully seldom wandering completely afield."

Success with the slide shows led gradually to the more complicated multimedia programs, including slides, music, and narration. "For a nonrational or a metarational idea, the lecturer should step aside," Hine said. "Such themes as freedom in the mind of the mountain man, the emotional quality of frontier revivalism, racial attitudes emerging in the Mexican War...such subjects are best presented in full multimedia fashion."

While Hine thinks multimedia shows help to catch the attention of students who have grown up in a world filled with television and motion pictures, he worries about using them too much. Usually there are only 4 or 5 multimedia presentations in 20 or 25 class meetings. "I still think of my job as the traditional one—to provide some sort of rational analysis—and my courses include the usual things—lectures, readings, papers." Typically, undergraduates in Hine's American West course read his own text, supplemented by three or four other works, such as James Fenimore Cooper's *The Last of the Mohicans* and Mark Twain's *Roughing It*. Hine once required a paper of each student, but the class now has grown too large for that to be practical. Grading is on the basis of a midterm examination and a final, which cover the material in the multimedia shows as well as the lectures and readings.

Hine does not want his multimedia work to be considered part of "the 1960s attack on rationality." "I don't share Theodore Roszak's skepticism about the rational approach," Hine said, "but I guess what I would share is the belief that there should be more to the educational process—fleshing it out, I suppose."

This striving to convey emotional experience has brought some criticism of Hine's multimedia efforts. After watching the fur trade show, Dericksen Brinkerhoff, chairman of the UC Riverside art department, complained that there was little relationship between some of the slides shown—"a succession of views of western types made by Russell and Remington"—and the facts of the fur trade period.

"Can you imagine how you would respond to a student who brought in a paper purporting to concern itself with a restricted period that drew its evidence in such large part from outside that period?" Brinkerhoff asked Hine. "Would you not point out that, whatever the merits of the paper, it should have been labeled as treating a theme and perhaps its aftermath?"

He added, "Emotional arousal constitutes a powerful tool, and the material subjected to exposure by feeling should be carefully defined. You deserve plaudits for approaching the students on their own wavelength, and I can only applaud your intentions. We also teach them to respect their evidence."

Hine agrees in part. "Sure, what Derick is talking about is traditional historical evidence that I would never want to stray from," he said. "But once you say you're trying to deal with universal human emotions, and you're not dealing with the strict historical problem of events in a given time and place...then you can't say you've destroyed something by looking at Remington's fur trapper rather than some other fur trapper. Derick is talking about the old history, which is very good but not enough. I am seeking universal human emotion that transcends time and place."

This is a point that other instructors seeking to duplicate Hine's success with multimedia might want to ponder. Do the shows add to a student's knowledge of history or do they distort that knowledge by placing too heavy an emphasis on emotional material? Does "The Social Bandit" glamorize outlaws and overplay their role in the history of that period? The presentation ends with the playing of a beautiful Mexican folk song and the recitation of a protest poem while pictures of Cesar Chavez and California agricultural workers flash on the screen. Does this, as Hine believes, "capture the spirit of a people who will not be absorbed" or does it confuse the outlaw response of the Mexican bandits with the nonviolent union organizing of Chavez?

Hine is reasonably happy about the success he has had with multimedia but feels that other professors ought to make their own shows that suit their own needs. To those who do try multimedia, he recommends that they "make it meaty and not just illustrative, don't expect it to be quick and easy, and be careful about the choice of topic—the more obvious 'coverage' sort of topics are things you shouldn't do." These bits of advice, and more, will be in a guide Hine hopes to publish in 1976. But the most important piece of advice probably won't be in the guide—the multimedia approach is no better than the instructor who employs it.

"Bob Hine was already a great teacher; it wasn't multimedia that made him great," said department chairman Gaustad. "It doesn't make a poor teacher a good one, but I think it might make a routine course more interesting, and a routine teacher as well." ■

Learning experience:
The American West; prerequisite: survey of U.S. history; enrollment: 80.

Contact:
Robert V. Hine, Department of History, University of California at Riverside, Riverside, California 92502; (714) 787-5400.

A Family History Approach to the American Revolution

"By our explanations, interpretations, assumptions," said Hugh Trevor-Roper, "we gradually make [the past] seem automatic, natural, inevitable; we remove from it the sense of wonder, the unpredictability, and therefore the freshness it ought to have." At the University of Iowa in Iowa City, Linda K. Kerber is trying to dispel the mechanical, inevitable aura from the teaching of history, and to restore to it the human unpredictability and vital freshness we have generally come to associate with the examination of current rather than past events.

Meeting with her class on "The Revolutionary Generation, 1760-1815" once each week for two hours, Kerber seeks to treat the period extending from the prerevolutionary Anglo-American crises to the War of 1812 as a temporal unit, focusing not on discrete events but on the individuals and families who witnessed and created the living events we now know as history. The emphasis is on uncovering and examining the choices and decisions made by people under pressure during those trying times, and also on the changing political priorities of the colonists.

Conducting the class largely by open discussion, Kerber resorts to brief formal lectures only when there is a need to review a great deal of material quickly, or when she feels it necessary to introduce a supplementary subject. The response to the open format by the 20 or so students—mostly juniors and seniors with a few first-year graduate students—has consistently been good.

Students have also responded well to the clear statement of two major goals for the course: first, to raise and examine some large historical questions whose consideration is still valid and pertinent today. Among them: Did the children of the revolutionaries agree with their parents' prescriptions for the new nation? Was there a generation gap between those who reached maturity in 1770 and the group that came of age in 1790? What happens after a revolution is over? To what extent was national political independence in America echoed by the personal independence of individuals?

Secondly, the family history approach attempts to determine and elucidate the complex intertwinings of individual experience with historical fact and political generalization. Students seek to discover, for example, why a man such as John Adams was moved to remark, "The Stamp Act was...a project set on foot for my ruin as well as that of America."

The course relies heavily on extensive and intensive biographical readings. A small core of elite families—by and about whom the most has been written—tend to dominate the reading list; but Kerber has been careful to include a number of lesser-known families and individuals in order to maintain a balanced perspective. Additionally, there are readings of a more general sociopolitical nature that serve to provide a historical and philosophical background against which the individual case studies can be more fully appreciated and understood. Examples are Edmund Morgan's *Birth of the Republic*, and R. R. Palmer's *The Age of the Democratic Revolutions*.

Students are sometimes surprised, however, to find the very first reading for the course is always *Rip Van Winkle*—carefully chosen for its emphasis on discontinuities and its treatment of temporal disjunctions. Ending the course is a reading and discussion of *Common Sense*, examining the correspondence between familial and political relationships, and presenting a case for political independence by analogy with the dynamics of family structure.

The primary requirement for students apart from readings is the preparation and oral presentation of a paper in which an individual, family, or locale of the revolutionary period is examined and evaluated with regard to the subject's response to the revolution and the later events that it set in motion. The student papers generally focus on the subject's perceptions of events of the time, on the making of political choices, and on the subject's apparent expectations for the future. Students are encouraged to write about lesser-known individuals wherever feasible and may choose to examine the history of their own family if it can be traced sufficiently far back in time.

Although no special materials or facilities are required, Kerber's course does bear the general expense occasioned by a necessarily low student-faculty ratio. For those colleges and universities that can manage the small class size, the approach is easily adaptable to other periods of national trauma, such as the Civil War or the Great Depression. It might also lend itself to historical examinations of unrelated disciplines, such as art or science.

Formal class evaluations by students rate the course highly, students generally feeling they have gained a good perspective on a major aspect of a highly complex subject. The family history approach has, says Kerber, "been a way of mediating between abstract generalizations on the one hand, and an overwhelming mass of detail on the other."

For more information: Linda K. Kerber, Department of History, University of Iowa, Iowa City, IA 52242; (319) 353-4481.

Freeing the Teacher to Teach

Computer Tutorials in History

In his twice-weekly history survey lectures at the University of Notre Dame, Robert Burns used to cover reams of material. More detailed analyses were relegated to sections led by teaching assistants (TAs). But he sensed that students were not responding to the traditional format, and this lack of interest was reflected in declining history enrollments.

Burns and his colleagues were convinced that survey courses transmitted essential information about history, culture, and values. What they sought was a way to free the teacher to do more than merely transmit content. To that end, Burns began to explore the possibilities of computer-managed instruction (CMI). An economics professor, Bill Davidson, was developing multiple-choice computer tutorials for one of his economics courses. With his help, Burns designed a program that became part of his Early American History course in September 1973.

Programmed in VS Basic, a simple computer language adaptable to any terminal, the tutorial is readily exportable to other campuses. Questions are short, and students must run them sequentially. Each consists of a brief lead, the question itself, four answer choices, and explanations of why and how answers are right or wrong. There are 20 sequences of 12 questions each.

"Originally we thought the students would use the computers simply to review lectures and assigned reading material," Burns said. "But instead of searching for the right answer, they often deliberately punch the wrong answer key to satisfy their curiosity—they learn both from correct and incorrect answers."

The history program is on the terminals every day from 8 a.m. to midnight, giving students ample time to visit between lecture classes. They can take as much time as they need for each sequence and can request the same sequence as often as they like. In this sense, the computer is more responsive to their learning styles than the rigid 50-minute lecture. Students are given a printed record of the tutorial experience, and can follow up on troublesome points at section meetings.

With the help of a $110,000 grant from the Sloan Foundation, Burns has recently developed a more ambitious two-semester freshman level tutorial in Western Civilization. Unlike the American History program, which based questions on material from one specific course text, Western Civ can be used in conjunction with most basic texts and accompanying readings. Leads and responses to questions are longer and more sophisticated, and students can call up any one of the 560 questions in random order. The drawback is that the computer language, PL 1, must be used with IBM equipment, and is therefore less exportable.

So far CMI has been difficult to evaluate formally. "We have tried to establish control groups working with printed questions and answers," Burns explains, "but when students learn about the tutorials, you can't keep them off the terminals." Comments from students reflect enthusiasm: "What the classroom discussion left ambiguous the computer cleared up."

"I was really amazed at the amount of material I actually learned and could remember about a subject that previously was definitely one of my least favorite...."

"It was a game, and we were learning at the same time." In addition, class averages appear to be better since the program began, and CMI students score higher than nonparticipants on exams.

Teachers who wish to develop their own CMI segments do not need to know computer language. Questions can be cast into an easily mastered, prescribed format, which is then keypunched and turned over to a programmer. However, devising the questions is precise, time-consuming work. The teacher has to decide just what he or she wants to cover, if CMI is to do the job of disseminating course content. Since developing a new program is also very costly, teachers may want to consider already existing tutorials, available on magnetic tape from Notre Dame. These include, in addition to the history sequences, introductory courses in economics, biology, and English grammar.

How has CMI changed Burns's approach? "Previously in a lecture on feudal monarchies, I would range over kings and barons in different countries, the Magna Carta, the development of the English parliament, centralization in France, and Frederick II in Sicily and Germany. Now I can give in-depth treatment to such subjects as the Magna Carta and parliament, knowing full well that my students are learning the rest and enjoying it." Tutorials, he says, "are giving teachers the chance to spend more time hypothesizing, analyzing, making judgments, and explaining why they made them."

The following is excerpted from a computer printout used in the Western Civilization tutorial.

Besides highly valuing the virtues of humility and obedience, the Benedictine rule required all of the following activities except one. Which one of the following activities was discouraged by the rule of St. Benedict?

1. *Manual labor in the fields or in the monastic buildings.*

2. *Intellectual labor in the monastic library or copying rooms.*

3. *Prayer and meditation.*

4. *Pleasant conversation and cheerful dispositions.*

Your choice is? 2

This statement describes a highly valued activity in Benedictine houses, but as an answer to this question it is incorrect. Preserving and copying ancient texts was a major activity in Benedictine houses, and the modern Western world owes those patient monks an unpayable debt for the wisdom of the past which they preserved and transmitted to us.

Your next choice is? 3

This statement describes a highly valued activity in Benedictine houses, but as an answer to this question it is incorrect. Religious devotions were the essence of the religious life. The daily routine of every monk was organized around the regular performance of them.

Your next choice is? 4

Your answer is correct. Cheerful dispositions were part of the virtue of humility, but conversation of all kinds was strongly discouraged. St. Benedict was quite definite about the virtuous quality of silence: Monks should restrain their tongues, keep silent, and not speak until questioned. When a monk does speak, he should do so gently, without laughter, in few and sensible words.

For more information: Robert E. Burns, Dean, College of Arts and Letters, University of Notre Dame, Notre Dame, IN 46556; (219) 283-6642.

The Risk of Exposure

History Teaching at the Community Colleges — by Myron Marty

Community colleges are teaching institutions. So say the keepers of conventional wisdom in the community college movement. But where is the evidence? It is not enough to claim that since research is left to universities—to the detriment, many would say, of good teaching—community colleges must be where creative teaching is found. Cut through the reports on computer-assisted instruction, audio-tutorial methods, simulation and games, the uses of media, team teaching, and other inspired claims of superiority and what do we find? Perhaps that we don't know as much as we think we do.

For the past several years I have monitored the responses of the historical profession to a sharply awakened realization that their discipline is in trouble in schools and colleges. Waning interest, abetted by relaxation of graduation requirements, has brought an enrollment decline to the history departments at many institutions. Whether poor teaching has contributed to the decline no one knows. I suspect it has not, for I doubt that teaching in history is inferior to that in other disciplines. Yet there is a growing consensus in the profession that improvement is needed, that if improved teaching does not attract more students, at least it will better serve those who do enroll.

One might expect community colleges as teaching institutions to have representatives at the forefront of efforts to vitalize history teaching, but such is apparently not the case. Three years ago the Newsletter of the American Historical Association (AHA) published in two consecutive issues requests for information on creative approaches to teaching employed by history faculty in community colleges. There were only two responses—one of them a sarcastic expression of disbelief that the AHA should care about such things. For the past two years I have co-edited a column on teaching in the Newsletter; efforts to turn up usable reports on happenings in community colleges have been all but fruitless.

As a member of the Committee on History in Schools and Colleges of the Organization of American Historians, I have been equally frustrated in trying to put my finger on systematic attempts by individuals or departments to improve teaching. I have not even been able to find good teachers who want to share their classroom success stories. Nor, apparently, have the editors of The History Teacher, for articles by community college teachers in this journal are rare—almost as rare as [illegible] presentations or demonstrations at meetings of professional associations. The only national forum in which many community college teachers seem to be at home is that provided by the Community College Social Science Association in its meetings and its quarterly journal. Presentations and articles in this forum are of uneven and sometimes embarrassing quality.

> *"Marty's suggestions as to why he has had so little response about good teaching strike me as explaining the lack of response in past years to the American Historical Association about good teaching at four-year institutions.*
>
> Paul L. Ward, Executive Secretary Emeritus, American Historical Association

No doubt many exciting things do go on in community college classrooms. Why don't we hear about them? Why are there so few coordinated efforts or funded projects aimed at improving the quality of history instruction? (The only one presently in existence is based at State University of New York at Stony Brook, although additional projects may be patterned after it if the AHA is successful in procuring funding. The Stony Brook project stresses cooperation between community colleges and universities.) I can only speculate as follows, based on my experience as both observer and a community college teacher.

We community college faculty members are ambivalent about our identity. Where identification with secondary schools is strong, one finds indifference to participation in the affairs of the historical profession or to grant projects. Yet to the extent that we do identify with higher education, we suffer from the same malaise in the teaching of history that prevails in all undergraduate situations. We need not be reluctant to acknowledge this situation. How many colleges and universities have things going on that they can point to with pride?

In some senses we do suffer from unique problems. The unmatched heterogeneity and fluidity of our student constituencies challenge the ingenuity and drain the time and energy of the most resourceful of teachers. Our teaching loads are heavy, both in numbers of students and hours spent in class. Teaching assistants are unheard of and secretarial help is limited. In these circumstances, is it surprising that creative solutions to instructional problems are not bubbling forth?

Furthermore, because most of us who teach history in community colleges were trained as teachers rather than as historians, in general we lack the inclination and facility to write for others. And that calls attention to a notable absence in community colleges of any peer evaluation. Those who write are accustomed to having others judge their competence; those whose only forum is the classroom often regard observers as intruders. Perhaps observation through the intermediary of the written word is also seen as a threat.

The highly idiosyncratic nature of the discipline of history encourages privacy and contributes to the lack of communication concerning creative practices and joint projects. My best teaching could not be replicated by my colleagues, nor could I emulate what goes on in their classrooms. History, wrote Lord Bolingbroke, is philosophy teaching by example. What makes a class exciting is not the planned and packaged pronouncements but the obiter dicta. Awareness of this may discourage history teachers from undertaking the kinds of cooperative projects that elicit outside funding.

There is a risk in anything that sacrifices individuality to uniformity, provided, of course, that the individuality is productive. That is not to say, however, that nothing is worth sharing. Channels for communicating with others now exist, and I shall continue to monitor them, hoping that they may soon provide more evidence that community colleges are indeed teaching institutions.

Myron Marty is a member of the history department of Florissant Valley Community College, 3400 Pershall Road, St. Louis, MO 63135; (314) 524-2020.

PSYCHOLOGY

Identity Crisis in Psychology

by J. Russell Nazzaro

Psychology has been and continues to be a rapidly expanding field at the undergraduate level. It is estimated that 250,000 students were majoring in psychology in 1975. In 1974, psychology majors accounted for about 52,000 bachelor's degrees, a 375 percent increase over 1964 (compared with a 274 percent increase in social studies, a 224 percent increase in humanities, and a 187 percent increase in the natural sciences over the same 10-year period). This increase has created intense competition for admission to graduate schools: In 1974, there were 130,000 applications for 14,000 openings, with a ratio of 30 to 1 in clinical psychology.

The increasing number of students majoring in psychology despite the difficulty of getting into graduate schools and the scarcity of jobs suggests a growing interest in the subject matter itself. A recent article in the *New York Times* by Larry Van Dyne noted student interest in quasireligious cults, astrology, extrasensory perception, meditation, and mysticism; and while psychology has traditionally not addressed these areas, it is not uncommon now to find courses in death and dying, transactional analysis, human sexuality, and parapsychology. Some schools offer courses in self-help (such as behavioral control of smoking, weight, and so on). However, these are generally not counted among requirements for completion of the major.

Over the past decade, the undergraduate curriculum has developed some noticeable polarities. With the advent of Carl Rogers and his following, some departments at California State University, Sonoma, for example, began to offer psychology courses with a humanistic or developmental bent—emphasizing self-concept, group dynamics, and communication and interpersonal skills. This trend represents an antiscientific movement that for the most part has not gained widespread popularity within the academic psychological community.

Another approach challenging scientific psychology is a trend toward offering more applied psychology courses. This has occurred largely as a result of the worsening economy and student demand for "saleable skills." Some undergraduate institutions are developing two-track systems, one for pregraduate training, the other for bachelor-level applied psychology. In general, however, the curriculum continues to emphasize scientific content at the expense of personal adjustment or applied psychology courses.

Within the profession, the experimental approach is still held in the highest esteem, and in most colleges and universities, research is the first criterion for retention, promotion, and tenure decisions. Good teaching has come to be an almost equally important factor, but only within the last decade. Meanwhile, emphasis on research and science has left its mark on students who have adopted their teachers as role models. But with the current lack of academic jobs and the "tenuring up" of psychology departments, there has been little staff turnover. Psychology graduates cannot readily find research positions and have to accept teaching positions which many consider less desirable.

J. RUSSELL NAZZARO is the administrative officer of the Educational Affairs Office of the American Psychological Association.

"An impressive characteristic of these programs is the high degree of teacher involvement. I suspect that as much as anything else the teacher investment accounts for success.... It is pretty easy to find instructors who are enthusiastic about what they have done and who have made some converts who are also enthusiastic. It's a good deal harder to demonstrate that a method actually facilitates student learning."

Wilbert J. McKeachie, President, American Psychological Association

Despite the increasing visibility of these trends, the most extensive change in the undergraduate psychology curriculum in the last decade has occurred in methodology. Surveyed in 1969 about significant innovations within their departments, chairpersons invariably reported changes in teaching methods. These innovations included individual student research, field experience, independent study, student involvement in course planning and teaching, programmed methods (particularly contingency-managed courses using the Keller method), audiovisual technology, and grading alternatives.

Certainly the most significant of these changes has been the Keller method. Now widely used in the U.S. and a number of other countries, the method emphasizes self-pacing, sequential materials, frequent testing before allowing students to proceed, and, most important, individual attention to student differences. The methodology stems from the techniques developed by B. F. Skinner with an assist from the growth of public accountability. Because the technique does away with lectures as a means of communicating information, it has caused much consternation among college administrators, hard-pressed to evaluate staff. (After all, if professors don't stand in front of a class and lecture, what do they do?) Additionally, the method insists on nearly perfect retention of subject matter, which skews grade distributions toward the upper end, thereby exacerbating the current concern about grade inflation.

How can we explain the current interest in methodology? One clue to this transition is the new student. The large increases in student enrollment have necessitated new techniques, not so much to handle more students using the same staff as to respond to the diversity of student needs. J. A. Kulik's 1969 survey pointed out that the majority of students taking psychology courses are not majoring in psychology. Further, most students who major in psychology do not pursue careers in it. The new technology allows students to pursue their special interests and the methodology allows for individual differences. An interesting aside with regard to the present generation of students relates to career opportunities: While a number of students are aware that traditional jobs for psychologists are drying up, a recent survey has shown that many students are not concerned whether these jobs will exist for them.

The growth of community colleges has also effected some changes. One third of all psychology majors have taken their introductory course at a community college. Because community colleges are primarily vocationally oriented, the introductory course is often weighted toward applied psychology and personal adjustment. Psychology departments at universities are thus faced with trying to turn students toward a more scientific approach to psychology.

Still another clue to the interest in methodology is psychology's emergence as a very popular service course for other fields. New teaching methods (for example, field experience) may have developed in an effort to tailor psychology to the needs of these other fields.

The American Psychological Association (APA) has been interested in the teaching of psychology since its formation, and one of the APA's primary boards—the Education and Training Board—has devoted a great deal of energy to the undergraduate level. Curiously, only recently did the APA develop a journal (*Teaching of Psychology*) aimed specifically at methodology. Yet one of the largest divisions of the association (2,500 members) is devoted to the teaching of psychology.

Psychology has been defined as the science of behavior. Among its subdisciplines are theories of learning, educational psychology, and social psychology. It seems only natural that the teaching of psychology should employ psychological theory and methods to develop a more efficient and more highly motivating presentation of subject matter. □

With the aid of computer-simulated experiments, the teaching of research design becomes more manageable—and exportable.

Understanding the Total Process

by Judith Miller

Psychology, like many other disciplines, has its share of hallowed rituals. Among the most sacred is the undergraduate psychology major's first laboratory course—known not-so-affectionately in the trade as the "rat lab." By 1969, the University of Michigan's rat lab had become an undisputed rat's nest. The laboratory was attended by more than 250 freshmen and sophomores competing fiercely for time to run their rats through the 15 often malfunctioning Skinner boxes. When rats inconveniently died in the middle of experiments, as they frequently did, there was no money to replace them. Stop watches and other testing equipment were either broken or in short supply. It was—in brief—a course no student wanted to take and no instructor wanted to teach.

Dana Main, an assistant professor of psychology at Michigan, was assigned to coordinate the laboratory course in 1970. Faced with the prospect of further budget cutbacks, she decided to take drastic action to save both the course and her students' psyches. "We were really desperate," Main recalled. "I feared a full-fledged student revolt."

While there was little money for psychology, Main discovered some research funds available for the use of instructional computers in course work, and she began to wonder whether computers could be used effectively to simulate actual laboratory experiments jeopardized by the university's budget crunch. She invited Richard Johnson, a Michigan graduate then teaching at Earlham College in Indiana, to talk to interested young instructors about his work in computer simulation. Johnson's interest in the field had been generated by a desire to improve laboratory teaching, which led him to develop simulation games and eventually to computers. "If computer simulation could solve his problem," said Main, "I thought it might be able to solve ours as well."

That was five years ago. Today, more than 76 educational institutions are using some form of what has come to be known as "EXPER SIM" (Experiment Simulation) in natural and social science courses—psychology, sociology, political science, statistics, chemistry, and fluid mechanics.

Put simply, EXPER SIM is a system for teaching research design and strategy through computer simulation. Students design and run their experiments not in a laboratory but on a computer programmed to generate the raw data they would have obtained had they performed the experiment in a real laboratory test. Though EXPER SIM's popularity and proliferation have been enhanced by heightened university sensitivity to economic efficiency, Main and others claim it is, first and foremost, a pedagogical breakthrough.

"What began as a money-saving innovation," says Main, "has proved to be an excellent device for improving the way scientific method and analysis are taught." Main's work has led her to conclude that EXPER SIM is far more effective than the "classical" method of instruction. "The average undergraduate entering an elementary laboratory course," she explains, "is usually given a set of standard experiments which he must perform. He spends most of his time collecting data—waiting to see exactly how many times the rat, for example, presses the bar to get a drink of water. Success in this course is related to how well the student can carry out certain procedures and arrive at 'correct' answers. Through this process, he is expected to glean the scientific method. He really isn't allowed to think until he's in graduate school."

EXPER SIM reverses this educational sequence. Rather than introducing research to the student by teaching him to repeat traditional ex-

JUDITH MILLER is the Washington correspondent for The Progressive and a frequent contributor to Change Magazine.

periments and age-old procedures, it enables him to ask the questions and derive the hypotheses on his own. All that is required is an acquaintance with the general background material in a particular field. In psychology it might be learning theory; in political science, attitudes toward foreign policy. Once the student has completed a survey course in the field, he can then review a list of relevant variables from which he can choose one or more to examine in his research. These variables, and the relationship between them, have already been entered by the instructor (who does not need a computer background) as a model on the computer.

The student studying learning, for example, might consider such variables as the rate of reinforcement, distribution of practice, and IQ. A political science major might be given political party, level of education, sex, and age as variables in an attitudinal study. After studying these variables, the student formulates a hypothesis he would like to test. After formulating his research design, it is fed into the computer, which in turn gives the student the data he then must analyze. Thus, the EXPER SIM student rehearses all the major roles of the scientist except the expensive and time-consuming data collection step.

Another strength of the method is that the student can follow up on experiments. In regular labs, time and financial constraints severely limit the number of experiments a student can undertake during a term. With EXPER SIM, after analyzing the data, the student generally has time to plan new experiments based, say, on inexplicable results of the first experiment. He may even explore a new hypothesis. The only factor limiting the number of experiments a student can perform is availability of computer time.

Main points out that the program can still provide the student with a professional scientist's awareness of research costs. Under the EXPER SIM program, the more a student wants to know—the more intricate his research design, the larger the number of subjects and manipulative variables—the more expensive his experiment. The student is given a budget at the beginning of the term and told to live within it; this, Main claims, discourages frivolous experimentation and forces students to design projects judiciously.

"During one of my courses," Main says, "I decided to give my students an experience common in their chosen profession. I told them that the Department of Health, Education and Welfare had just cut their research funds by 20 percent. They groaned and complained they couldn't possibly complete their work with so little money. After the initial shock wore off, however, most of them devised ways of coping." Most of the students in her class began working in research teams, a not uncommon phenomenon in science. Others preferred to go it alone, scaling down their ambitious research designs. "Whatever they did," she adds, "it was their own choice; no instructor stood over them issuing guidelines."

> "The average undergraduate entering an elementary laboratory course is usually given a set of standard experiments which he must perform.... He really isn't allowed to think until he's in graduate school.

Another advantage of EXPER SIM is the variability of research results generated by the computer models. Because the computer contains summaries of sets of relationships between variables rather than raw data (which are costly to store), a student may run the same experiment five times and get slightly varied results each time. A variation on the EXPER SIM program developed at Michigan encourages students to think through and challenge their own hypotheses. This is done by developing a large model and telling the students about only some of the variables. Students are then forced to consider what factors not present in the experiment might account for unanticipated results.

In order to work well, EXPER SIM must involve the professor, who uses the model to teach students what questions to ask; the model builder—often an instructor or a graduate student—who safeguards the integrity of existing models and constructs new ones; and the programmer, who translates the model into Fortran IV or another computer language. Though she supervised the project at Michigan, Main's background is in psychology, not computers. "I still can't program," she admits.

EXPER SIM was established at Michigan rather quickly and at relatively low cost—about $14,000 over 5 years—with the help of a few computer specialists. The project was initially launched with a modest seed grant from the Michigan-based Center for Research on Learning and Teaching, which provided enough money in the summer of 1970 to hire a graduate student full time. The original models put into the computer for students to explore were all designed by graduate students—largely on their own time. These models are now part of an EXPER SIM library, from which students can select a problem area to study, much as they might select a book from the shelf. The models can also be correlated with a wide range of subject matter in the behavioral sciences. At Michigan, for example, there are models on the etiology of schizophrenia, motivation in routine tasks, the effects of drugs on learning, social facilitation, imprinting in fowl, and a fictional account of life in the Bunko-Ramer pornographic napkin holder factory (motivation and industrial psychology).

The napkin holder factory model, which has gained substantial popularity among students, was designed by Robert Stout, a Michigan-trained statistician who also developed a supervising program, called the "Michigan Experiment Simulation Supervisor" (lovingly known as MESS), that permits students to use the data-generating models without having to learn a great deal about computers. The MESS program, written in Fortran IV, is somewhat like a nanny that looks after computer-naive students: It corrects their spelling and typing errors when they feed information into their computer terminals, adjusts for column entry errors, and generally gives students asking questions or issuing commands the benefit of the doubt.

Though now employed at Butler Hospital in Providence, Rhode Island, Stout is working on a program—called SWIP (Simulation Writer Interactive Program, funded by the Exxon Education Foundation)—that will further obviate the need for a fully trained computer programmer in EXPER SIM. Under SWIP, the instructor or graduate student can build a model in English rather than in computer language, provided he has access to large, sophisticated computer equipment.

Many educational institutions, of course, lack access to such systems, but EXPER SIM also has a program for small computers called LESS—the Louisville Experimental Simulation System—designed by Arthur Cromer at the University of Louisville and written in a computer language known as Basic. While Main says the LESS program is a bit more difficult for students without computer experience to use, a new model can be entered into the LESS library without a computer programmer.

EXPER SIM has definitely been a success at Michigan. In the last five years, about 2,000 students have used it to explore the scientific method cheaply and efficiently. Because Michigan has a computer on which students can purchase time, the cost is about $8-9 per student per term. Michigan students usually take EXPER SIM in their sophomore year, after completion of an introductory course in psychology. The course requires about one eighth of a student's total term load.

Evaluative tests conducted by Main and her colleague, Richard Nussloch, tend to confirm EXPER SIM's value. While at Michigan, she compared test scores of students in the computer classes with those of students who read and studied the literature in the field. She found that the computer class designed far better research proposals than the group without computer simulation experience. EXPER SIM students were judged "far superior" in their ability to control potentially independent variables, to set up a complete set of independent variables to test a hypothesis, to sketch a procedure, and to design an adequate experiment to test a hypothesis.

Main also found, somewhat to her surprise, that the EXPER SIM students included in her study mastered the content (measured by a 12-item multiple-choice exam) "significantly better" than the group that had merely studied the literature. "Since we are very involved and highly committed to the development and use of the program at the University of Michigan," Main cautions, "it is possible our zeal has spilled into our evaluative research. But we invite any group to repeat our evaluative test or compare EXPER SIM to any other approaches to teaching science."

The Exxon Education Foundation has believed for some time in the program's pedagogical potential. The foundation has provided funding to develop an instructor's manual and to encourage broader dissemination of the EXPER SIM concept. Dana Main, too, is committed now to spreading the gospel. She has taken a year's leave of absence from Michigan to bring EXPER SIM to the colleges of West Virginia.

> "Many traditionally trained faculty members at universities resist innovations like experiment simulation precisely because it runs against the grain of their training.

Main is headquartered at the West Virginia College of Graduate Studies, a public graduate school founded in 1972 at Institute, a suburb of Charleston, the state capital. What attracted her to the area was the possibility of plugging EXPER SIM into West Virginia's statewide computer network, financed by public funds and currently shared by the West Virginia Board of Regents, the state college system, and the College of Graduate Studies.

John Breed, a systems analyst working to install EXPER SIM on the statewide computer, said that 13 colleges will ultimately have access to EXPER SIM capability. The statewide computer is a hybrid, a combination of "batch" (a system in which IBM cards are fed into the computer, compiled, and analyzed with some time lag) and limited "interactive" (which generates a response to each question or command posed by the student). Since the network is interlocked, students and instructors at different computer ports throughout the state will eventually be able to communicate through their ports with each other, and exchange and compare models and results. Because the state picks up most of the tab, the university need pay only monthly computer rental costs, $200 a month for telephone lines, and about $140 a month for telephone and terminal interface with the computer. "Without a state computer system," says Breed, "we would have to pay $50,000 a month for the system the state now shares."

Main is teaching a course in research design to graduate students at the College of Graduate Studies, but she and other faculty members also teach graduate courses in other parts of the state, since the college is committed to serving students in 16 counties. "My work with graduate students here is vital for EXPER SIM at the undergraduate level," says Main. "In order to offer it to college freshmen and sophomores, we must first expose their future instructors to the concept." In addition, she believes strongly that models built for students must be relevant to the needs and interests of West Virginians. "This sort of fine tuning takes time," she adds.

How are Main's students taking to the computer? With gusto, from all accounts. Kathy Willis, a graduate student working toward a Master's in elementary education at the graduate college, took Main's EXPER SIM course last term and is now working as her graduate assistant. "I think it's a great teaching tool," she says. While students in her class were initially wary of using the computer, by the end of the course about two thirds of Willis's 15-member class had been turned on to EXPER SIM's possibilities. "I used to sit up nights just fooling around on the terminal," she said. "It was really easy once you got the hang of it."

She also points out that EXPER SIM is useful for the student who needs to

learn scientific method and logical analysis but would not particularly benefit from collecting the data himself. "In my first simulation," she said, "I compared the performance of single versus paired cockroaches as they went about easy and difficult tasks. Although I learned a lot about the effect of pairing, or company, on a subject's ability to perform, I never even saw a cockroach—which is OK by me."

Willis is now working on a model in language development, testing 8-, 12-, and 18-year-olds in linguistic ambiguity—i.e., with sentences that can be interpreted in several ways. She hopes eventually to be able to develop further models in her own field. "The only thing that limits EXPER SIM now is the number and type of models available for students to explore," Willis concludes.

A shortage of models is not the only factor inhibiting EXPER SIM's proliferation. Main could not have accomplished all she has at the college without the support of her administration, and in particular, of Milton Grodsky, the college's vice president.

A psychologist who worked on the Apollo moon shot program during his 13 years with Martin Marietta Corporation, Grodsky believes in simulation as an instructional device. "We've been able to introduce EXPER SIM here because this college is not a tradition-bound place," says Grodsky. "We added 25 faculty members to our ranks last term."

Grodsky thinks many traditionally trained faculty members at universities resist innovations like experiment simulation precisely because it runs against the grain of their training. "Many professors have stopped examining ideas about curriculum and its objectives. It's hard to admit that many of us do not teach students how to think."

In addition to wariness about computer technology, still endemic in many colleges and universities, several criticisms of the EXPER SIM approach have been raised. Some scientists note that collection of raw data is an important part of an education in the natural and social sciences. Many psychologists, for example, argue that learning how to handle a subject in an experiment (be it rat, cockroach, or child) and the environment in which the subject operates are not frivolous parts of an education in science. In addition, some fear that the data-generating models may often be wrong, and may therefore misinform students. Others are concerned that the models may reflect current knowledge in the field too closely, and may stifle a student's inquiring mind.

The problem of faulty models is not confined to EXPER SIM. Main claims that since models are constructed from the current knowledge in the field, the student would receive erroneous information in whatever form it was offered if the literature itself were erroneous. Grodsky and Main also argue that the EXPER SIM method encourages a student to think for himself—to analyze the model's assumptions—rather than blindly repeat procedures that have been done countless times before.

The argument that EXPER SIM eliminates the data-collecting stage of research is taken more seriously by Main. "We do not underestimate the value of learning how to collect data," she says. "We simply believe that it should be sequenced at a later point in the student's undergraduate career, when his research interests have more of a focus. The traditional laboratory course often delays or restricts the student in his understanding of the total scientific process because an inordinate amount of time is spent learning to train rats or getting equipment to work. We believe such time and resources are better placed on the more advanced student who clearly understands all of the steps in the scientific process, and who can then place his struggles within the total framework."

Some instructors believe EXPER SIM requires an elaborate, highly sophisticated computer and technically trained personnel. "This is not true," says Main. A fairly simple computer will do, she claims. If the university does not have one, a local research facility or public institution is usually willing to rent the university time on theirs. As for personnel, Main claims an instructor can offer EXPER SIM after a few hours of instruction on general computer operations.

Interest in EXPER SIM is growing within West Virginia and elsewhere. The IMPACT program of the Exxon Education Foundation has publicized EXPER SIM along with three other innovations in college training, receiving requests for further information from more than 1,000 individuals. And last term, Main ran a conference at Pipestem Park in rural West Virginia to expose instructors and graduate students to EXPER SIM. Despite a fairly primitive telephone system (parts of the state still use phones that must be cranked up), Main was able to set up a portable computer and long-distance telephone connections to the system's main terminal in Morgantown, thus giving participants the experience of typing into the computer and getting immediate feedback. "Most of them were really turned on," she says.

In the spring, Main will continue her travels to colleges and schools throughout the state, and next year plans to establish seminars and perhaps even a full-fledged course for undergraduates in West Virginia. So far, she has every reason to be optimistic. ■

Learning experience:
Experiment Simulation: a system for teaching research design through computer simulation; prerequisite for use in psychology: one introductory psychology course is preferred.

Other descriptions:
"Toward a Future-Oriented Curriculum," *American Psychologist*, March 1972. "An Overview of EXPER SIM (Experiment Simulation) Pedagogy," in *Computers in Education*; Amsterdam: North Holland Publishing Company, 1975. "The Michigan Experimental Simulation Supervisor: An Overview and Some Prospects," *Behavior Research and Instrumentation*, Volume 6, 1974.

Where replicated:
Florida International University; University of North Carolina; the Lindenwood Colleges, Saint Charles, Missouri; University of Montana; Macalester College, St. Paul, Minnesota; Franklin-Marshall College, Lancaster, Pennsylvania; and others. There are over 40 installations of the EXPER SIM system at colleges and universities across the country, many of which service several institutions and are used in a variety of disciplines in addition to psychology, including education, sociology, chemistry, political science, and engineering.

Contact:
Dana B. Main, Division of Behavioral Studies, West Virginia College of Graduate Studies, Institute, West Virginia 25112; (304) 768-9711.

An introductory psychology course becomes less impersonal, fostering increased student participation through the efforts of a corps of carefully selected and specially trained undergraduate teaching assistants.

With a Little Help From Their Friends

by Peter Janssen

It was hardly a traditional psychology seminar. For one, the 11 students in a section of Cornell University's Psychology 101 course were meeting at 7:30 one cold, winter night in the basement lounge of a coed dorm. For another, Cal Cohen, the soft-spoken, bearded teaching assistant (TA) leading the section was only a senior. And then there was the class itself.

"We're going to be physical tonight," Cohen began, asking everyone to push the plastic, overstuffed chairs to the outer limits of the lounge. He then asked two volunteers to lie on the floor. He told the rest of the class to kneel down and hold the volunteers' arms and legs. The volunteers were supposed to try to get up, as the students holding them down chanted "Get up, get up." After a few minutes of general confusion, Cohen called a halt and explained the moral of the lesson: "It is often the people who tell you to get up who hold you down." Everyone groaned good-naturedly, but Cohen warned: "Think about it; that's heavy."

What makes the class even more unusual than Cohen's teaching method is the fact that he is one of 21 undergraduate TAs in Cornell's Psych 101 (Introduction to Psychology) class who lead small sections at least once a week. Cornell has been using undergraduates as TAs in the course for the past 10 years—with increasingly good results. Says James B. Maas, the associate professor who teaches the course and set up the undergraduate TA program: "Everybody seems to benefit. The TAs say it is the highlight of their undergraduate career, while the students seem to like it too."

Maas is the likely proponent of such a system. He started teaching as a senior at Williams College in 1960; when a professor became suddenly sick, Maas took over the class. "They said I did a good job," Maas recalls, "and it was so stimulating that I decided to stay in teaching." He began teaching at Cornell in 1964 and acquired a reputation as an excellent teacher.

The recipient of Cornell's Clark Distinguished Teaching Award in 1972, he received the Distinguished Teaching Award of the American Psychological Association (APA) a year later. Maas served as the first director of Cornell's Center for Improvement of Undergraduate Education and as the president of the APA's teaching division.

When Maas started teaching Psych 101 it was then considered a huge crowd—400 students. In fall 1975 the class had 1,200 and was so big that it had to meet for lectures on Monday, Wednesday, and Friday in the university's concert hall. (Cornell's second largest single lecture class is about a third the size.) Officially, Psych 101 is designed to probe "the basic psychological processes such as brain functioning, perception, learning, and motivation; students are also introduced to more complex processes such as frustration, conflict, and behavior pathology." To keep things moving, Maas uses film and slides extensively, frequently showing 80 to 90 slides per lecture. In addition to attending three lectures,

PETER JANSSEN is the former education editor of Time Magazine and now senior editor at Money Magazine.

Psych 101 students must also attend one section meeting a week. The sections are supposed to hold 15 students each, but some are a bit larger.

Other psychology professors were dubious, to say the least, when Maas first used undergraduate TAs for the sections in 1965. "We were waiting for him to fall on his face," says one. "We were certain that the students would complain. After all, they're paying all this money for tuition, and what do they get for a teacher but somebody who's only a year or so older who may or may not be a personal friend. We also were pretty certain that undergraduates did not know enough or have the experience to lead a section. But the way Jim has carried this off, we've changed our minds." Maas admits that "the department was very skeptical at first. But now they're convinced. At least three other psychology courses are using undergraduate TAs, and other departments—chemistry, physics, mathematics, and biology—are using them too."

A major key to the success of the program, of course, is the selection of the teaching assistants. Until last spring, Maas selected and trained all the TAs himself. He now has the help of Gregory Carroll, who has almost completed work on his doctorate. Many prospective TAs know of the program because of their own experiences as students in Psych 101. To cast as wide a recruiting net as possible, however, Maas places an ad in the Cornell *Daily Sun*, the student paper, each spring. (Psych 101 is taught only during the fall semester.)

Applicants must have earned an A- or better in Psych 101 and hold at least a B+ cumulative average at Cornell. They must list all psychology courses they have taken (and grades), and include recommendations from faculty members. They also outline the topics they would like to teach in their sections. The job is prestigious—and popular; 15 students apply for every one accepted.

The undergraduate TAs do not have to be psych majors. "If they are not," says Maas, "they must have something else pretty unique—like a lot of work experience in a mental hospital." Maas whittles down the list of applicants to about 75, and then schedules half-hour interviews with them. Says Maas: "I look for the way they speak, to see how nervous they are; an interview is somewhat anxiety-ridden, but then so is teaching. I try to weed out the people who are doing this for ego building."

He also poses a series of questions about teaching problems: What would they do if they found out that another TA gave everyone in his section an A? How would they handle a student who talked too much? How would they structure their section? Do they have any ideas for bringing in guest speakers, for using slides, film, or other techniques to get away from a lecture-type situation? "Above all," says Maas, "I wait for the kind of feeling you get when you are pretty sure that someone can handle himself in front of a group of people. Basically we want TAs with sincerity, liveliness, and who are enthusiastic about the idea of teaching. Next to knowledge of content, the enthusiasm and motivation are probably the most important."

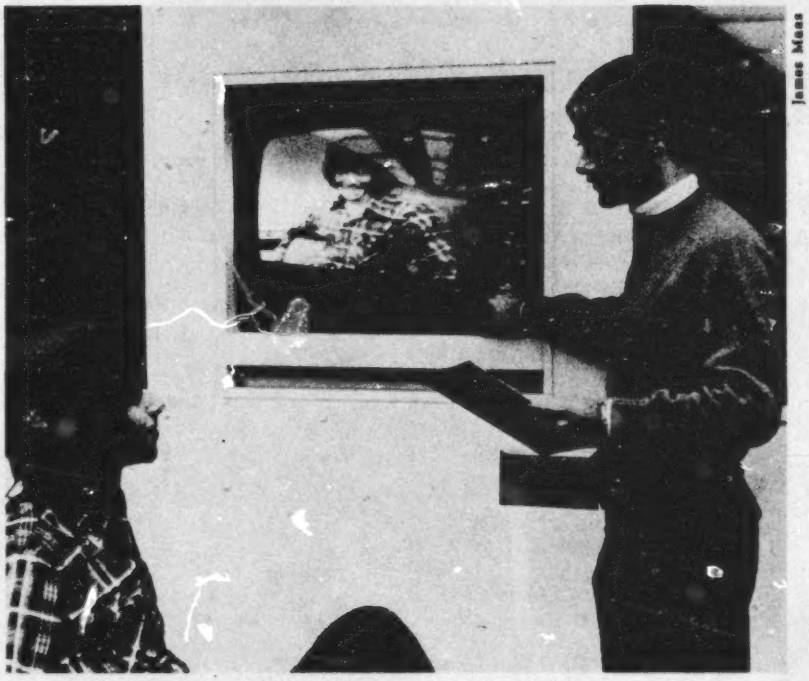
An undergraduate teaching assistant returns research papers during her seminar.

Once the TAs are chosen Maas invites them over to his house for an organizing session before summer vacation. "We talk business for about an hour—and then socialize for two," he says. The relationship between Maas and all of his students seems relaxed. He tells everyone—TAs, advisees, visitors—to call him Jim, and he tries to overcome the massive impersonality of his lecture class by showing up at 12:30 every Friday in a small conference room outside his office with a sandwich. He stays there for two hours, meeting with anyone who cares to drop in.

The TAs meet with Maas and Carroll just before school starts again in the fall to make sure they are prepared for their sections. Once actually teaching, they are videotaped at the beginning of the semester and often again toward the end. After the first taping Carroll meets with them individually to offer hints and advice. "TAs in the past often have been a neglected, forgotten group," says Carroll. "It seemed that they were assigned by the flip of a coin and they sometimes taught as if they wished they were someplace else. But our TAs really care about what they're doing, and they know we're here if they need help." When Carroll reviewed the first batch of videotapes, some of the TAs "were really amazed. They would look at the tapes and see they were looking down at their notes, preparing the next question instead of listening to the answer. Or they'd discover a tic or mannerism they thought they'd lost years ago."

In 1975 there were 19 junior and senior TAs giving Psych 101 sections for the first time; two seniors were teaching it for the second time, and four TAs were psychology graduate students. They all, undergraduates and grads alike, seemed to gather around the psychology department lounge to gossip, relax, and exchange ideas. They also seemed to have a

good relationship with Maas. "My rapport with them has been very good," says Maas, "but they have some hesitation about coming to me with their dirty laundry. After all, I write their letters of recommendation to graduate school, so they always want to look as if they're on top of things when I'm around."


James Maas

Every undergraduate teaching assistant has the opportunity to review tapes of his or her teaching with the professional staff.

Undergraduate TAs take two sections the first time they teach; if they are invited back again the next year, they take three. Graduate students teach four. Undergraduate TAs receive four credits on their transcripts the first semester they teach; if they are invited to teach a second time, they receive a waiver of tuition and fees. Grad students receive a $2,000 stipend and a waiver of tuition for each semester they teach. Obviously it is far cheaper for Cornell to utilize undergraduates as TAs than to employ the more traditional grad students, a point that is not lost on the university in hard financial times. Just a few years ago, for example, about half the TAs in Psych 101 were grad students and half were undergraduates; last fall there were 21 undergraduates and only four grad students.

The Cornell semester has 15 weeks, but the TAs don't meet with their sections until the third week, and they meet individually with their students in the middle of the term to plan research papers, so they must plan 11 section lessons. "We tell them to start the first section with something debatable so students will start talking," says Maas. "We don't want them to lecture—and they don't want to either. It works best if they are discussion leaders and not authority figures."

Several years ago, the TAs' sections were parallel to Maas's large lecture courses; in essence, they were a review of the Monday-Wednesday-Friday lectures. Now, there often is little relationship between what Maas lectures about and what the TAs discuss in their small sections; in fact, if there is any overlap, it is coincidental. The Psych 101 TAs have extraordinary freedom. The choice of what they teach depends almost entirely on what they want to teach. The subjects they talk about are the same as the ones they proposed to Maas when they applied for the job. Maas approves the subject, by extension, when he hires the TA who wants to teach it, but after that the topic is in the TA's hands.

The students, meanwhile, select which discussion section they want to sign up for from a list handed out the first day of Maas's large lecture (the names of the TAs teaching them are omitted). All 1,200 students list six choices; 70 percent get their first choice, and 90 percent get one of their first three. Some samples from last fall's list:

Section 803 - "Does Familiarity Breed Content or Contempt? Why do we find some activities more interesting than others? Why do individual preferences differ or why do they conform? How do our interests change over time?"

Section 812 - "Psychology and Medicine. Is there psychosomatic illness? What does the dying patient experience? Does acupuncture work? Should brain surgery be an acceptable practice?"

Section 809 - "Sleep, Dreams and Sleep-Learning. Why do some people always seem to sleep well and others poorly? Can sleep-learning be used to break certain habits such as nail biting?"

The TAs are supposed to spend three hours a week preparing for their sections and one hour a week in office hours. They also must attend Maas's three lectures and help prepare questions for the "prelims" and the final exam. They do not grade exams; that is done by a machine. The entire section grade, however, counts as 30 percent of the course grade, and most TAs take their grading function very seriously. Most also award about 80 percent of the section grade on the basis of the assigned term paper, the rest on participation in class.

The TAs serve to break up the impersonal nature of the lecture course. "When I took Psych 101 I was overwhelmed by the inhumanity of the course," says TA Cal Cohen. "My Psych 101 TA was my only human contact. He helped me a lot, and he turned me on to psychology as a career."

For his section on the role of men in society, Cohen tries to get students themselves to ask questions. He will prompt the discussion, but often simply lean back (he is wont to hold sections where everyone sits on the floor) and let the students talk to and question each other. Cohen admits that readings for the section are "light," often consisting of articles from *Psychology Today* and once of a

sex survey that originally appeared in *The Village Voice*.

At the end of one section Cohen's students started talking spontaneously about what they thought of the course. "I enjoyed coming here," said one boy lying on the floor, "but I will walk away without any major changes. It's neat here, but it hasn't produced a radical change." Cohen simply replied: "My goal was not to change your life but to increase your awareness." Most of the students agreed that he had done just that. After the section two students praised Cohen (who holds office hours in the Temple of Zeus, an on-campus coffee house) highly. "I'd be scared to death to discuss with Jim what I discuss with Cal," said Rick Brownell, a senior. "And I'm older than Cal. But it's easier to communicate with a person closer to your age." Grant Smalz, a sophomore, said he "really enjoyed the sections because you get to express your opinions. Cal is near our peer group and he understands what we're saying."

In another section, on black psychology, Ada Admiora, an undergraduate TA, skillfully led nine students through a discussion of race and intelligence testing. "You can't give the same test to a person who is Jewish as you would give to a person who is Italian," maintained one student. "Why?" Admiora asked softly. The student tried to explain what he meant, and gave up. Another student came to the rescue. "The things they learn when they are small are so different. Most people in the United States call a car a car, but people in my neighborhood call it a sling. So the kids there don't know what 'car' means; maybe some other people don't know what 'sling' means. When they grow up they'll be able to translate the words they know into the words used on tests, but they won't score well on tests at first." Another student with a Spanish accent commented that "here I am at Cornell and they told me in kindergarten I was a dummy. Somebody screwed up someplace."

Learning experience:
Introduction to psychology, enrollment: 1,200.

Other descriptions:
"The Role of Undergraduate Teaching Assistants," *Newsletter* of Division II of the American Psychological Association, March 1973. *Manual for Teaching Assistants*, Harvey R. Bernstein in collaboration with the Center for the Improvement of Undergraduate Education, available through the Office of the Vice Provost, Cornell University.

Similar courses:
College of William and Mary, Williamsburg, Virginia is one of many institutions across the country which have received information about this course and are using undergraduates as teaching assistants.

Contact:
James B. Maas, Department of Psychology, Cornell University, Ithaca, NY 14853; (607) 256-6302.

Maas believes most undergraduates actually do a better job of teaching sections than graduates. "Grad students tell students everything they know—they lecture at them," says Maas, "and that's pretty boring. And graduates have other things on their minds than leading an introductory seminar. This is pretty far down on their list of priorities. Also, grad students who come from other universities have never taken the course before. The undergraduates, meanwhile, are highly motivated to do a good job. This is a pretty status-filled job for them."

To judge how undergraduate TAs themselves felt about their experience, Maas passed out a questionnaire at the end of the semester. "I enjoyed the individual autonomy I received and being my own 'boss,'" wrote one TA. "However, there were times when I felt downright alienated from 101. I had hoped that the meetings would have instilled more of a team spirit, a sense of closeness in the group. Although we spoke freely with one another, we never really seemed to be tied into the total course." The overall response, however, was far more positive. And most TAs were impressed with the videotaping. "I can't believe the difference between my first and second recordings," said one.

There is no way to tell exactly how much Cornell's Psych 101 students actually learned from the course compared, say, with students in an introductory psychology course at Brown or Berkeley. At the last lecture of the term, Maas passed out a 64-item questionnaire asking students to answer a series of questions about the sections on a five-point scale (five is high). Did the TA seem knowledgeable? 4.3. Was there ample opportunity to ask questions at the seminar? 4.9. How interesting was the discussion section? 4.4. How would you rate the discussion leader? 4.35. How much did you learn from the discussion section? 3.9. These responses seem to suggest that the students actively participate in the sections and like them, although perhaps they realize that the amount of new academic content introduced in the seminars may not be all that rigorous.

Many questions on the evaluation also dealt with the course as a whole, not just with the sections. The same questionnaire is used to judge other large lectures at Cornell, making possible comparisons from one course to another. For Psych 101, the comparisons were quite favorable; it ranked in the ninetieth percentile compared with all other Cornell courses in the evaluation. Some specific results, again on a five-point scale: The students' overall opinion of the entire course was 4.4; the teaching skills of the professor, compared with other teachers at Cornell, 4.5; student interest in the course, compared with others at Cornell, 4.0; stated objectives of the course, compared with the outcome, 4.5; the teacher's presentation of material in the lectures, 4.7; whether the teacher stimulated their interest in the subject matter in the lectures, 4.4.

Understandably enough, Maas is pleased with the evaluations, particularly with student comments. "The lectures were great, entertaining, and informative," wrote one senior. "I have a tendency to fall asleep in my other lectures. But this one kept my interest." A sophomore was equally praising: "This course is exhilarating, fast-paced, the best I've had at Cornell."

The TAs themselves, meanwhile are an extremely enthusiastic group. Over the years more than a dozen have earned doctorates in psychology and are now teaching. At the very least, the undergraduate TAs in Psych 101 get new insights into higher education. "After they've taught a section, their grades tend to go up in other classes," says Maas. "They say they start thinking like a teacher—and I guess that's not too bad." ■

While learning traditional content, students are trained in psychological self-help, doing unto themselves as they would unto others.

Everyman as Psychologist

by C. Eric Lincoln

Clayton Ladd is chairman of the Department of Psychology at Eastern Illinois University in Charleston, Illinois, a pleasant little school plopped down in the middle of the rich, black prairie of east-central Illinois some 200 miles south of Chicago. Despite his easy informality—even his undergraduate students call him Clay—Professor Ladd has a substantial reputation as a resourceful and innovative teacher and practitioner, as well as a theorist staunchly dedicated to demythologizing psychology and putting it to work as a people-helper at a nonprofessional level.

Paraprofessional training in psychology is, of course, not new. It has been under development by various service agencies for the last decade. That is precisely the point that excites Dr. Ladd. "If effective people-helpers can be trained by service agencies in a few weeks or a few months," he reasons, "why can't all of us be trained to be paraprofessionals capable of helping at least ourselves during 16 years of formal education?" The intriguing notion that everyone might to some degree become his own psychologist, capable of recognizing some of his own problems and designing effective methods to cope with them, has occupied Clay Ladd for the last several years. What he is doing about it is what brought me out to Eastern Illinois University.

Clayton E. Ladd was born in Tennessee in the early years of the Depression; his parents later moved to a farm in Indiana. After a year at Earlham College, he was graduated cum laude from Miami University in Oxford, Ohio, and went from Naval ROTC at Miami into the Marine Corps where he spent two years, including a stint in Korea. Military service behind him, he settled down at the University of Iowa, where by 1960 he had a PhD in psychology. There followed a series of consultant and teaching posts at clinics and universities in Iowa and Indiana. In 1962 he became chief psychologist at Long Adult Psychiatry Clinic at Indiana University Medical Center in Indianapolis. From there he went in 1966 to Southern Illinois University as associate professor of psychology, and counselor at the university's Counseling and Testing Center. During this entire period, Ladd maintained a continuous research program and served as consultant to various other institutions. He has been published frequently in such journals as the *Psychological Bulletin* and the *Journal of Clinical Psychology*.

At Southern Illinois University his work acquired a focus he considers to be, if not the wave of the future, then at least the way the future ought to be. In 1972 (by now a full professor), he developed a course (P-330) called Psychology Applied to Personal Adjustment, "an effort to teach scientifically validated techniques for modifying behavior, gaining insight, learning new skills, etc., in such a way that the student can practice applying the methods to change herself or himself in ways she or he chooses." With a staff of eight, including graduate students, the course was offered to between 300 and 400 students a year. As a text for the course, Ladd wrote the first draft of *Psychological Self-Help*, a 500-page mimeographed manuscript he is now revising and supplementing with new data before offering it for publication.

When Ladd moved to Eastern Illinois University in 1974, P-330 went into the catalog as Psychology 3550 (Mental Hygiene) with the description: "Stresses the problem of maintaining mental health as related to home, school, civic, and other social situations." The course, as taught by Ladd, is, however, substantially the same as that developed earlier at Southern Illinois, with refinements based on what was learned after offering it to several hundred students there.

By the time Dr. Ladd and I arrived on campus it was 8:30 p.m. We

C. ERIC LINCOLN'S essays on education have appeared in Daedalus, the journal of Negro Education, and other major literary forums. Dr. Lincoln is director of the Division of Humanities at Fisk University.

hurried into a modern building and took the elevator to the third floor where one of Dr. Ladd's facilitator groups was meeting. I had hoped we could observe with minimum intrusion, but we were expected, so Professor Ladd called time out, made introductions all around, and explained to me what role facilitators played in the teaching of Psychology 3550.

The course is grounded in the lectures of Dr. Ladd and his colleagues in the department, and his *Psychological Self-Help* is, of course, the basic supporting text. However, a great deal of learning and help takes place in small group encounters led by co-teachers or facilitators—students who have been through the course and want to deepen their involvement and experiences by helping others. At the session I attended, there were 8 or 10 facilitators present, both graduate and undergraduate. It was an affable but serious group of young men and women who sat or lounged on the floor while discussing the progress and problems of their respective groups and planning TA (transactional analysis) skits for the next group meetings. We spent about two hours with the facilitators and then set out for a student apartment where a marathon small group encounter was in session. The marathons—which may run 10 hours or more—are held twice a quarter at the option of the students, and are intended to provide feedback and personal encounter, allowing participants to learn from the experiences of others.

Since the marathons are student initiated, Dr. Ladd didn't know exactly where it was being held, but after ringing two wrong doorbells at 10:30 in the night we found the group in session on the second floor of a small apartment complex on the edge of the campus. The room was shadowy, lit only by the blinking lights of a small Christmas tree and the coal-red eyes of a ceramic cat on the mantel. Introductions were made, and as my eyes adjusted to the on-and-off twilight, I could see eight people seated on the floor in a tight circle. Seven of them were women, all in blue denims. A lone male, the group leader, was assisted by a black woman who seemed totally immersed in the proceedings.

The marathon had been in session since mid-afternoon and showed no signs of flagging. The participants engaged each other in conversation about their self-help projects, the remedies they were using, their successes and their failures. Sometimes they questioned each other closely about feelings and attitudes, and suggestions were made for alternative ways of dealing with problems that had not been solved after reasonable effort. There was a good bit of role playing and a rehearsal of some games the leaders intended to act out in class the following day. Professor Ladd and I left about midnight. The marathon was still in spirited session.

The next day, after extended talks with Ladd and a number of his students, I attended a lecture by Professor Ladd and the fragments of information and experience I had gathered the previous 24 hours began to fall into place. Late in the afternoon, as a final act of inquiry and participation,

Gary Granada

Small groups meet frequently to discuss their self-improvement projects.

I spent two hours on the floor as a member of a small group in an effort to personalize at least a part of the experience I had come to write about. By then I had some pretty clear notions of what psychological self-help was all about, and a much clearer conception of Clayton Ladd's vision of education as a logical means of improving and maintaining mental health.

According to Professor Ladd, more than 50 percent of all high school students take some college courses in psychology, and about 10 percent of all college students major in the field, now the fastest growing major in academia. There are many possible reasons why psychology is experiencing such popularity—not the least of which might be the pervasive undercurrent of anxiety deriving from the cataclysmic changes society has experienced since World War II and the continuing social instability we seem destined to live with for some time to come. But Professor Ladd finds the explanation in less ultimate, more personal concerns. "Students want to understand themselves and others," he says. "They are looking for self-improvement, and many hope for an interesting and satisfying career helping others who have problems."

That most contemporary departments of psychology are unaware of what college students are after, too inflexible to help them, or perhaps both, is to Professor Ladd a very obvious failing of the profession. "What are the 1975 heterogeneous psychology students given?" he asks. "A 1930 curriculum developed in elite Ivy League universities to produce PhD researchers and academics." He argues that such courses do not meet the needs of today's college students, and that they are completely oblivious to the needs of educationally disfranchised older persons. In a society so fraught with personal tensions and anxieties, less than half of the departments of psychology offer even one self-help course.

Clayton Ladd makes it clear he has nothing against the teaching of traditional psychology courses. Somebody has to train the professionals. However, he would like also to see serious offerings in paraprofessional, career-oriented courses at the bachelor of arts level aimed at producing "effective human service workers," and a broad offering of "personally useful" courses frankly designed for the self-improvement of the individual. To study psychology without learning anything applicable to one's own adjustment needs seems to Ladd a curious incongruity.

The paraprofessional training programs begun in the sixties showed what could be done. Methods involving theory-based treatment approaches directed toward both behavior modification and behavior theory were developed at a level easily understood by such nonpsychologists as parents, teachers, and practical nurses. An important byproduct of these methods was an objective research orientation: base-line data, behavioral counts, cumulative records, and so on, all of which, Ladd points out, are part of the self-help process. Transactional analysis, encounter groups, and the earlier T-groups were forerunners, but were too brief and lacked a substantive base. Some colleges were offering study skills courses which, while important, were only a very limited form of self-help.

"In the future," Professor Ladd predicts, "not only will colleges be routinely involved in self-help procedures, but self-help courses will be available from kindergarten to the grave. The educational system will collaborate closely with other human service agencies—mental health services, family and children services, welfare, employment and vocational rehabilitation, juvenile courts, drug information and crisis centers, and the like. The quality of service will be improved. Individual and public needs will be met sooner and more efficiently."

Crucial to the coming change in attitudes and procedures that will "deprofessionalize psychology and give it to the people" is a cadre of college-trained people who have themselves benefitted from self-help courses in

Learning experience:
Mental Hygiene, prerequisite: Introductory Psychology, enrollment: 80.

Similar courses:
Southern Illinois University and Salisbury State College, Salisbury, Maryland.

Contact:
Clayton E. Ladd, Department of Psychology, Eastern Illinois University, Charleston, Illinois 61920; (217) 581-2127.

Gary Grounds

Clayton Ladd, right, and two student assistants demonstrate the psychological game "Kick Me."

psychology. That is a fundamental reason for the existence of Psychology 3550 at Eastern Illinois University. According to the syllabus, the purposes of the course include the following:

- To teach aspects of psychology, particularly self-understanding, skills, and learning processes that may have utility in everyday life.
- To provide a great deal of encouragement, structure, and practice designed to facilitate the actual realization of knowledge of psychology in a systematic, rational, habitual way within each student's life.
- To provide learning conditions in which students can become more aware of their own individual ways of coping, and to encourage experimentation with different, more effective ways of adjusting.

The emphasis is on individualized reading and personalized self-help projects that enable the student to learn by doing something for himself—and get academic credit for it. Each student assumes responsibility (and skills) for directing his own life (thereby becoming his own therapist), but he must also evaluate each method's effectiveness (becoming his own researcher). The students help each other in the small group encounters, with graduate students or others who have taken the course serving as facilitators. Lectures, reading (both teacher-assigned and student-selected), peer teaching, demonstrations, practice, and homework are all part of the instructional methodology. Confidentiality is protected both by common agreement and by pledges signed by students and instructors defining the limits to engagement and the uses to which course-derived information may be put.

What kinds of problems do college students identify and attempt to resolve through psychological self-help? Obviously, the spectrum is broad and a typical problem may turn out to be not so typical after all. The range is from the superficial (e.g., losing weight or studying more effectively), to more intimate problems (e.g., fear of going crazy or inability to achieve orgasm). Some students want to regain control over drugs or alcohol. Others are concerned about difficulties in expressing their true feelings, sharing feelings with others, fighting male chauvinism, or breaking off a relationship. Still others want to overcome depression, improve sex relations, overcome homosexuality or accept it, have better relations with parents, conquer procrastination or indecisiveness, overcome anger, reduce various fears, or simply learn to like themselves. The problems selected for self-help are discussed with the instructors, who must also monitor the entire program of adjustment. If the problem seems serious or unresponsive, the student is urged to seek professional help immediately. If it appears physical rather than psychological, he is urged to see a physician.

Clayton Ladd helps students to help themselves.

Once a problem has been selected and physical causes have been ruled out, the student begins collecting and recording data with regard to its frequency or severity. He makes an effort to understand its causes, and is then urged to set realistic goals for its elimination. He is urged to think small, and to make certain his goals are not in conflict with his values or long-range hopes. Students are taught to analyze problems by "levels" keyed to certain self-help methods. Level I, for example, is concerned with the description of overt behavior, the environment which produces the behavior, and possible self-help methods (rewards, change of environment, etc.) to encourage more desirable behavior. Level V deals with unconscious motives and influences, and possible ways to uncover, understand, and change these factors.

Dr. Ladd believes the levels procedure facilitates an understanding of the more complex problems, and development of more sophisticated methods of dealing with them. The student then moves on from selection and implementation of a plan of treatment, to assessing and plotting his progress through self-observation. He may at any time revise his plan of treatment, if needed, to deal with his own resistance to change. If his efforts continue to fail, he may then seek professional help. Ideally, students are encouraged to focus on two or three problems at once, but not to overdo it by taking on so many that none receives enough attention to produce the desired results. When the project is completed, it is reviewed and reported by the student as a learning experience and as a piece of his own research.

Does psychological self-help work? Does it produce measurable, worthwhile results? True believers are adamant in their praise. One student wrote in response to a questionnaire: "My God, it's needed!" A student evaluation of the course at Southern Illinois University based on 400 students gave it consistently high ratings. Many students who took the course said they became more confident of their ability to change their lives, their self-concepts became more positive, and they became more self-actualizing and better adjusted in general.

Dr. Ladd cites other benefits to what he calls "giving psychology away." For one, he believes the course approach removes the stigma connected with seeking help on personal or interpersonal problems. In addition, more people are reached, students are more motivated. Self-reliance is encouraged, and the notion that only a psychiatrist or analyst can deal with the many common problems ordinary people have to cope with is rejected. Finally, the educational approach is seen as an ideal delivery system because of its multiple resources, because the amount of time available far exceeds that available to any other current delivery system, and because it provides a significant learning experience which can be immediately applied to real life. ■

Using undergraduate teaching assistants, a 25-page syllabus, written briefs, and personal interviews, a large course in the psychology of learning unites learning in theory and practice.

Teaching Learning While Learning to Teach

by John Egerton

Since joining the Dartmouth College faculty in 1967, George Christian Jernstedt has been teaching a course called Psychology 22: Learning. It has to do with the fundamental principles of learning—with what it is, and with how and why it takes place. As an intermediate course open to undergraduates who have taken Psychology 1: Introductory Psychology, Jernstedt's course usually attracts a large number of students, both majors and nonmajors. Enrollment has at times exceeded 200.

One way to teach Learning is through the traditional method of lectures and examinations, and Jernstedt has taught it that way. But there are other ways as well, and he has over the years experimented with a good many of them. In fact, he has made the teaching of Learning an experiment in learning—a continuous application of laboratory findings to life situations. He says people like himself interested in knowing more about the teaching-learning process have something in common with model-train builders: "We're never finished, we never have all the answers, we're constantly making modifications and adjustments."

Jernstedt has built his model train piece by piece, with the help of many of his students. He is still making modifications and adjustments. What has evolved thus far is an intricate system of instruction that includes a specific statement of course objectives, division of course content into units, and sequential mastery of each unit at a flexible, individualized pace.

Several factors have encouraged Jernstedt's experimentation. He is, first of all, an experimental psychologist, with a particular interest in human learning and cognition and in behavior modification. These interests have stimulated his curiosity about the learning process, and how best to apply it to individuals as individuals. Second, he realized—through the perceptive questions of some of his students—that exclusive use of the traditional lecture-examination format in a course on the principles of learning precluded application of the very principles he was seeking to communicate. ("If you're trying to teach us about the ways people learn, why are you using only one of those ways yourself?") And finally, finding himself in front of 100 or more students at a time, Jernstedt was dismayed by the lack of opportunity for personal exchange, the heavy dependence upon oratorical skill, the difficulty of gaining and holding the attention of all students, and the essentially passive nature of the students' role.

So Jernstedt set out to redesign his course in such a way that each student's experience could be flexibly shaped to maximize what he or she would learn. As it has evolved, the course now combines several individualized features with some conven-

JOHN EGERTON is a free-lance writer based in Tennessee and a frequent contributor to Change Magazine.

tional patterns of instruction. The class still meets for three 65-minute periods a week through a 10-week quarter, as it always has, and it continues to use letter grades, textbooks, and supplementary reading materials. But beyond that, it has acquired a number of unconventional features:

- The course syllabus, once a single-page outline, is now a 25-page narrative describing in detail the goals of the course, the procedures to be followed in it, the resources to be used, the system of performance evaluation to be followed, and the day-by-day activities making up the class schedule.
- In place of examinations, which have been eliminated altogether, the students are asked to write a series of one-page briefs on specified learning principles. Each brief receives swift evaluation and can be rewritten as many times as the student and the evaluator feel necessary.
- During regularly scheduled class meetings, the instructor and his students participate in experiments designed to illuminate particular concepts or principles. Class attendance is not compulsory.
- Six books constitute the body of readings for the course: *Fundamentals of Learning and Motivation*, by F. A. Logan; *The Cognitive Bases of Human Learning*, by E. Saltz; *Studying the Cognitive Bases of Human Learning*, by Jernstedt, M. R. Chaplin, and R. S. Guy; *The Grapes of Wrath*, by John Steinbeck; and one each of the following pairs of books: *How Children Learn*, by John Holt, or *Summerhill*, by A. S. Neill; *Walden Two*, by B. F. Skinner, or *Brave New World*, by Aldous Huxley. The readings and class activities form the basis for the short papers the students are asked to write.
- Frequently throughout the term, each student has an opportunity to practice orally what he or she has learned in a personal interview with the instructor or one of his assistants. In addition, students may schedule individual conferences as needed to discuss problems and progress in the course.
- To assist in the evaluations, interviews, and conferences, Jernstedt has organized a seminar—Psychology 81—to train about a dozen student teaching assistants. Entitled "The Teaching-Learning Process in the University," the seminar is actually a practice teaching experience for the further application of learning principles.
- Students in Psychology 22 may choose to participate, without credit, in Dartmouth's Outward Bound program, an educational experience of self-discovery which uses the challenge of nature as its teaching medium. The course and the program are designed as mutually reinforcing experiences.

> Jernstedt was dismayed by the lack of opportunity for personal exchange, the heavy dependence upon oratorical skill, the difficulty of gaining and holding the attention of all students, and the essentially passive nature of the students' role.

Simply stated, Jernstedt's approach is to lay out in detail the objectives of the course; to separate the material into small units; to let each student determine (within reasonable bounds) the pace at which he or she takes up and masters each sequential unit; to encourage repeated practice (with rapid feedback) of the skills and principles learned in each unit; and to evaluate, at the end of the term, each student's performance in the following: quantity and quality of effort, use of resources, self-motivation, degree of improvement, and demonstration of the concepts acquired and retained.

"Under the lecture method," says Jernstedt, "the most I can do is convey the same body of information to all members of the class at the same time in a series of lectures, and then ask them periodically for evidence of what they have learned. It's the same for everyone, and it works well for some. But the benefits are uneven; retention of the course material is not great; and there is really no satisfactory way to evaluate performance. What we're doing now, on the other hand, results in more and better work by all members of the class. Instead of simply working for some, it works for all in different ways. They not only learn the principles, but how to apply them. They also retain more of what they have learned, and I think the grades they receive have more meaning."

> This is nothing but good common sense. It's the application of some three-to-four-thousand-year-old ideas about learning. It's a flexible and adaptable concept, not a recipe or a fad or a gimmick.

In earlier years, Jernstedt used one textbook and one novel in the course, and students were asked to write four briefs; there are now six required books, and nine briefs are written (some of them rewritten as many as six or seven times). The additional work is primarily a result of a system of credits awarded for high-level performance—in essence, an incentive system. Credits are given for virtually every activity in the course, and activities can be repeated to improve quality. There is thus not only a correlation between the amount of work performed and the final grade attained, but also between basic ability and the final grade.

This system has significantly affected the distribution of grades. Instead of the traditional bell curve—a few A's and E's, a larger number of B's and D's, and a preponderance of C's—the scale now looks more like a steep incline, with a handful of E's at the bottom, progressively larger numbers of D's, C's, and B's, and a clear majority of A's at the top. The higher grade distribution, says Jernstedt, is an accurate reflection of student effort and student achievement: "The grades aren't inflated. We haven't diluted the content of the course—on the contrary, we've strengthened it. They're simply doing more and better work. They're involved in shaping the course, and they like it, and they're

succeeding at it."

Evidence of how much students like the course is not difficult to find. One indication is demand. Whenever Jernstedt has taught it, enrollment has had to be limited. Another measure of the course's popularity is the "Dartmouth Student Course Guide," a subjective assessment published annually by and for the students of the college. Here are some excerpts from the guide's comments on Psychology 22 in recent years:

> The freedom is immense, and you can use what you learn for the rest of your life. Isn't that what education is all about?
>
> The students saw that they could set their own goal in the course, and have several chances to attain it—no one-shot exam or term paper.
>
> It is not an easy course, nor is it usual. Rather, it is adapted and tailored to further, as much as possible, the learning experience of most of the students involved.

From these comments, it is apparent that the course is quite popular, and the reasons for its popularity are equally apparent. For one, Jernstedt and his cadre of assistants from Psychology 81 devote a lot of time to the project, and the individual attention each student receives is extraordinary. Each brief is evaluated and returned within 24 hours, and interviews and conferences on a one-to-one basis can be arranged at any time. Jernstedt himself relates well to students, and his assistants, all undergraduates, have the natural advantage that accrues to peer teachers. Together, the team of teachers is accessible and supportive. Jernstedt has even rigged up a feedback system on the college computer, making it possible for students to go to any terminal on the campus and check on their up-to-the-minute progress in the course. Every credit they have earned is recorded in the data bank, and they can even compare their progress at a given stage in the term with the performance of the class at the same stage in an earlier term. If the computer setup smacks of gimmickry, it is at least a useful gimmick.

There are other reasons for the popularity of the course. It invites student participation and involvement and choice. And it relates the subject matter directly to real situations and experiences. The students are more than just numbers in a lecture hall. They are constantly active, both in the classroom and as they work independently, and can depend on a quick response to what they say and do. They also have flexibility in the pace of their work, in the choice of books they read and write about, and in the actual amount of time and energy they invest in the course. As for real situations and experiences, they are talked about in class, read about in the novels, and faced directly in Outward Bound. Repeatedly, the students are called upon to relate the principles of learning to their own experiences, or to the ones they have heard or read about. One student, for example, chose to examine the concept of persistence by looking at the members of the Joad family in *The Grapes of Wrath*, who continued looking for work long after the possibility of actually finding it had disappeared. Another analyzed the fear she felt while learning to climb a cliff face during an Outward Bound weekend lab.

Jernstedt's syllabus, which is the basic handbook and guide to the entire course, is in itself a study in applied psychology—a tactful, persuasive, reinforcing introduction to the activities ahead. It flatly asserts that "grades will not be used to praise good behavior or to punish bad behavior," although grades are obviously important in the course, and grade pressure is, in fact, heavier than usual. The syllabus also characterizes rules and regulations as "odious," but again, the rules are there. The syllabus is, in fact, a rule book in that it describes precisely what the student must do to derive maximum benefit from the course. For example, no specific timetable of production is required, but Jernstedt's expectations are clearly implied in these words:

> Although you might at times proceed more rapidly or slowly than the schedule suggests, you will want to follow the particular order of activities rather carefully. Events during class meetings will assume that you are following the suggested schedule (and have read the indicated readings *before* class on the day indicated).

But it would be excessive to conclude that Jernstedt is disingenuous in his description of the course, and he carefully avoids making extravagant claims about what he is doing. "This is nothing but good common sense," he says. "It's the application of some three-to-four-thousand-year-old ideas about learning. It's a flexible and adaptable concept, not a recipe or a fad or a gimmick. What I hope will come out of it is a set of techniques and information on how they work. They will have to be modified to fit particular situations and circumstances. I'd rather see pieces of it pop up here and there, rather than as a package, or a recipe. In the long run, packages don't last—concepts do."

Pieces of it have popped up elsewhere at Dartmouth, and there have been other variations on the individualized instruction theme there as well, but most of the efforts have been short-lived. The main reason seems to be that it's simply too much work. George Wolford, a fellow psychologist, says Jernstedt's course "is very effective, because he gives it the time and the effort. I like some of the ideas of individualized instruction—flexible pacing, unit mastery, and so forth—but with a large class, it's simply too hard. There's no way you can give personal attention to 200 students."

Jernstedt found that out early in the game, and Psychology 81, his teaching-learning seminar, was organized at least partly because he could not shoulder alone the burden of reading 3,000 student briefs each term—not to mention the interviews, conferences, and other activities. Jernstedt selects his Psychology 81 student proctors from students who

> "Undergraduates are the greatest untapped potential we have for the improvement of education. They have helped to shape this course, and I have great respect for them.

performed exceptionally well in the learning course the previous year. They are typically in the top tenth of their class, but are not necessarily psychology majors. They begin meeting with Jernstedt two terms before their involvement in the learning course seminars begins, and a great deal of their training is devoted specifically to learning how to evaluate briefs. When the course begins, they meet with Jernstedt three or four times a week.

But even with the assistance of his team of proctors, Jernstedt has found that there are limits to the successful application of his teaching techniques. From start to finish, it takes him six months to plan, conduct, and evaluate Psychology 22, and that investment of time and effort has not diminished since he first started teaching it. "There must be better ways to optimize learning for large numbers of students," he says, "but we haven't found them yet. Some people who have used individualized instruction say the optimal ratio is 10 proctors to one professor and 10 students to each proctor. That comes to 100 students in a class, and that may be where we end up. We've come down from 200 to 135, and it may be that in order to give personal contact in a nonmechanical way—to keep from looking like a factory—we'll have to limit enrollment to 100. I think we've shown that we can provide an improved teaching-learning experience for a large number of students at no additional direct cost to the college, but it takes an enormous effort by everyone involved to do it."

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Still, the students keep coming, and making the extraordinary effort, and apparently thriving on the experience. In a recent issue of the student course guide, the Psychology 81 seminar was evaluated in glowing terms: "It's hard to describe, since you're more of a professor than a student, learning more and more as you teach. Consensus: The course is superb. If you get the chance, take it. Jernstedt asks for a lot but you get a lot in return." Jernstedt, for his part, is quick to return the compliment. "Undergraduates," he says, "are the greatest untapped potential we have for the improvement of education. They have helped to shape this course, and I have great respect for them."

Research and evaluation in connection with the teaching experiment have been constant. Jernstedt has several file drawers full of student evaluation forms and various other kinds of logs, records, reports, statistics, and research data, and he has written more than half a dozen articles, reports, and papers on comparative teaching methods and student performance. His colleagues in psychology apparently support—or at least indulge—his unconventional activities, and if they disapprove of his use of undergraduates as teaching assistants or the atypical distribution of grades in his classes, they discreetly avoid saying so publicly.

There is, however, a hint of something less than unanimous approval in the circumstances surrounding a decision regarding Jernstedt's tenure at Dartmouth in 1974. He was at first denied permanent faculty status and a promotion to associate professor, and then, after an unusual reassessment, was granted both. Jernstedt and his colleagues avoid discussion of the matter, and it is therefore impossible to say whether his unorthodox teaching methods finally weighed against him or in his favor. Whatever the case, the final decision was well received by the student body, and off-the-record comments of some faculty members indicate approval of the outcome—and a sense of relief that a potentially embarrassing situation was avoided. Said one: "Tenured faculty have a responsibility to take risks that younger faculty can't afford to take. Yet it too often happens that older faculty abdicate their responsibility, and untenured people are the only ones with the courage to act. Jernstedt was one such person. The granting of tenure to him, however belatedly, is an encouraging vote of approval for what he is doing."

> I'm impressed with the use of undergraduates as instructors, and I think that in both the Cornell and Dartmouth cases, the supervision and training of the undergraduates is one of the keys of success.
>
> Wilbert J. McKeachie
> President
> American Psychological Association

In Jernstedt's syllabus for Psychology 22, the four-page section on the "suggested schedule of activities in detail" is crammed with more work than seems possible to accomplish in 10 weeks. The textbooks and novels that must be read, the class sessions on conditioning and reinforcement and behavior modification, the movies with "life situation resources" for class meetings, the Outward Bound laboratory, the briefs to be written and rewritten, the interviews and conferences to be scheduled—altogether, it is an enormous load. Yet each fall term when the course is offered, there are the students waiting to get in. ■

Course:
Learning; prerequisite: Introductory Psychology; enrollment: 100-200.

Other descriptions:
"Comparison of Four Teaching Methodologies for Large Lecture Courses," *Psychological Reports*, Volume 36, 1975.

Contact:
G. Christian Jernstedt, Department of Psychology, Dartmouth College, Hanover, New Hampshire 03755; (603) 646-2778.

Students as Behavior Therapists

Students taking the University of Michigan's undergraduate course "An Introduction to Behavior Modification" are sent into the field as behavior therapists for a major part of their course work. "Our students," says the course's instructor, James V. McConnell, "usually are better therapists than the senior staff supervising them." The students are sent to mental hospitals, prisons, elementary and high schools, hospitals and halfway houses for the mentally retarded, Michigan's own University Hospital, and assorted private clinics.

The students' accomplishments are the product of a two-course sequence. In the first course, McConnell lectures twice a week on general systems theory and learning theory. The class of 300, all of whom have taken an introductory psychology course, also meets once a week in small discussion groups led by teaching assistants. Students are drilled in modeling (i.e., demonstrating desired behavior), role playing, desensitizing, communicating goals in measurable terms, and in responding positively, even when being critical. They are also taught physical skills, such as muscle relaxation.

Students contract for a grade and each grade elevation requires additional reading, examinations, reports, and "self-shaping" projects in which students must demonstrate that they have modified their own behavior in some way. Failed examinations are retaken until the grade contracted for is finally earned.

Ninety-five percent of McConnell's students earn an A or an A+. An A+ is required for admission to the second course. To earn this grade a student must select a therapeutic problem and write a report on it. Between 75 and 100 qualify for the second course each semester.

For the first two or three weeks of the second course, students read, attend lectures by senior therapists, and participate in role-playing games that are videotaped. More exams follow; then for the duration of the 15-week semester, students work with patients. One teaching assistant supervises every five students.

When a student meets a patient, the two write a contract, defining therapeutic goals, appropriate rewards, and the criteria for measuring success. The contracts are approved and signed by the student, the patient, all supervising faculty, and the appropriate staff of the patient's institution. Students are taught to cooperate with the participating institution and at all costs to avoid internal politics.

The students then attempt to modify patients' behavior through modeling and a variety of reinforcements, such as food, money, insight, praise, encouragement, and friendship. Having defined patients' goals in measurable terms, students keep graphs of progress and strive to be positive and supportive.

In the course's five-year history, students have trained paranoids to talk in socially acceptable fashion, toilet-trained regressive patients, tripled the reading and math scores of prison inmates, trained kidney patients to stay on diets, assisted brain-damaged patients in learning social control, taught stroke victims and mute schizophrenics to speak, retarded children to read and write simple words, and paralyzed retardees to walk. McConnell reports that in many instances students have accomplished what doctors had dismissed as impossible.

More than 1,000 patients have been treated by students since the course began and McConnell says the rate of successful contract completion has held consistently between 80 and 90 percent. Whenever possible, McConnell maintains ongoing records of all patients treated, and he estimates that 70 percent of their behavior modifications remain effective. Institutions, at first understandably cautious about giving students access to patients, now clamor for more student therapists than the course can produce.

For more information: James V. McConnell, Department of Psychology, University of Michigan, Ann Arbor, MI 48104; (313) 764-4224.

Telelectures: Direct Exchange With the Finest in the Field

Gerald C. Mertens, associate professor of psychology at St. Cloud State College in St. Cloud, Minnesota, felt it was so essential to bring his students into immediate contact with the finest professionals in his field that in 1970 he began organizing tours for students to visit prominent psychologists.

Two years ago, Mertens isolated what he feels are the true benefits of such excursions. "It was the possibility of exchange," he explains, "the questions and answers—not 'touching the robe'—that were important." In an effort to achieve the goal in a less complicated manner, he obtained a telephone company device that allows for complex conference calls and "tele-lectures."

The tele-lecture equipment plugs into any telephone outlet and amplifies the incoming voice to room-sized audibility. Since the unit can also be connected to a public address system, audience size is virtually unlimited. The phone company also supplies audience microphones so that the incoming speaker can be questioned (Mertens has found that such feedback is best routed through an on-site moderator).

Since tele-lectures eliminate the complexities of scheduling and traveling, Mertens has found it easier than ever to reach prominent psychologists. In general, he writes to a particular authority and offers a $25 honorarium. No one has yet refused to participate—nor has anyone protested the $25. Mutually convenient scheduling is then arranged.

Regional costs vary, but St. Cloud State's expenses have included a $40 installation fee and a monthly $10 rental fee. There is an additional toll charge per lecture, which is the standard charge for a long-distance call—though prearrangement allows such charges to be station-to-station.

Anyone at St. Cloud is allowed access to the system, though Mertens believes he has used it more than anyone else (four times in one behavior modification course). Total annual costs have run approximately $400, which provides approximately 10 tele-lectures per year. Among those psychologists who have participated, Mertens catalogs "B. F. Skinner at Harvard, Nate Azrin at Anna State Hospital in Illinois, Dave Fischer in California, Harris Rubin at Southern Illinois, Willard Day at Nevada, and Ted Barber in Medfield, Massachusetts."

The value of a tele-lecture ultimately rests in the question-and-answer sessions (otherwise, a tape recording would do as well). Though some speakers have supplied audio-visual material in advance to accompany their long-distance exchanges, in general Mertens finds that the more important (or dynamic) the speaker, the longer students stay involved without any visual embellishment at all.

Mertens sees great potential for the tele-lecture system. Since conference calls can be easily set up among several institutions, one speaker could address as many as half a dozen audiences at once. Similarly, such a system could permit vicarious attendance at distant professional conferences or allow the author of a freshly published scholarly article to be cross-examined in front of a wide audience before the article loses its initial impact. And finally, denizens of the social fringes, convicts, addicts, prostitutes, could be interviewed by students without ever compromising the participant's anonymity.

For more information: Gerald C. Mertens, Department of Psychology, St. Cloud State College, St. Cloud, MN 56301; (612) 255-2138.

Intergenerational Exchange—Learning to Relate

Douglas Candland, a psychology professor at Bucknell University, decided several years ago that his father's advancing age made it wise to move him near his son's family. Candland found him a small apartment in a building occupied by several Bucknell students. His father, then in his early seventies, moved in amid the students—with their rock music, long hair, and the rest.

"I noticed after he'd lived there about three months," Candland recalls, "that his strong views on long hair, race, and a few other things went away." As Candland mentioned this phenomenon to his students, he found them surprisingly interested in the elderly. "I found that they felt cut off from older people—completely isolated. They really didn't know what older people had done or what they had gone through." They were fascinated, for instance, by his father's stories of his days in the silent-film industry.

This interest evolved, in 1970, into a cooperative, cross-generational living unit at Bucknell. The house, which is owned by the university and located on the campus, accommodates from 15 to 20 students each year as well as several local people in their sixties, seventies, and beyond, who move in for stays of a week or two. The expectation behind the project has been the usual one for a living-learning venture—that the sheer experience of living together will result in significant learning for those involved.

Since 1974 a modest grant from the Fund for the Improvement of Postsecondary Education has allowed Candland to spin off several related experiments. One is an outreach program in which one student and one senior citizen are teamed to go out into the surrounding counties (where about 15 percent of people are over 65) to urge senior citizens to maintain an active life in their communities. A second activity is a series of weekly discussion groups in which the young and old exchange perspectives on a variety of topics, including death, sex, and religion. Yet another effort involves an attempt to convince older Americans, many of whom have never attended college, that their experiences (during World War II or the Depression, for instance) qualify them as resource persons in selected university courses.

Candland is also developing a new interdisciplinary course on the process of aging to be taught by a team made up of a sociologist and a biologist. The course, he believes, is a crucial part of the whole cross-generational project because it will rely directly on the experiences of the young and the old for source material rather than on a textbook. He hopes it will serve as a model for colleges that have moved elderly people into underutilized dormitories but have not gone much beyond that to involve them in campus life.

Although the growth in the number of students involved in various phases of the Bucknell project (from 7 in 1970 to about 200 in 1975) is one indication of its popularity, there are, in addition, two efforts at formal evaluation. Final results are not in, but the project already has generated considerable good feeling. Candland tells, for instance, about an old woman who lived three blocks from campus and had not left her small room for five years. "She would sit looking out her window as the students walked by. One day one of our teams called on her and got her outside to meet some of the students. Now that's an exception. There are no miracles in this business. But it is important. In a way, she had just been sitting there waiting for someone to pay attention."

For more information: Douglas K. Candland, Department of Psychology, Bucknell University, Lewisburgh, PA 17837; (717) 524-2365.

Teaching on Film: Better Than TV and the Lecturers Are Always at Their Best

More than once when he has gone out for an evening at the theater, James Jenkins has been approached by film buffs who think he looks very familiar. "What have I seen you in lately?" they ask. His answer: "Psych One!"

Psych One is the introductory psychology course at the University of Minnesota's huge main campus in Minneapolis—a course taken each year by as many as 5,000 undergraduates. It has been taught to a mass audience since the 1930s, and has moved over the years through at least three distinct incarnations—from live lectures to videotaped, closed-circuit television in 1966 to color film in 1971. Jenkins and two colleagues—David LaBerge and Kenneth MacCorquodale—are the stars of the film version.

The use of television in such courses is not all that unusual, of course, but putting the whole course on color film is. The three faculty members, working with the university's media resources center, have produced 45 films of 40 minutes each. These are shown again and again to large audiences in a campus auditorium each quarter (twice a day in the fall).

Although expensive to produce (roughly $45,000 for production and revisions), the films appear to be an economical way to teach once the costs are spread out over the thousands of students expected to take the course over several years. The initial investment of the three professors' time was substantial too, but now they can turn much of the day-to-day operation of the course over to graduate assistants.

Student evaluations suggest that the films are not as popular as live lectures, but they are vastly preferred over the old television course the psychology department offered. Jenkins points to a set of student ratings that were collected over a span of many years. Some 91 percent of students who took the course as a live lecture said they would recommend it to a friend. Only 50 percent would recommend the television course, while 68 percent recommend the film version.

Color film can exploit some of the same visual techniques as television—motion, color, and special effects like closeups—but it has two big advantages over the tube, say the course's originators. One is that film can be magnified, thus making the image of the professor more in scale with a large lecture hall than he would be on television. "We take a professor and amplify him," says James Butler, the man from the media center who produced the films. "We literally make him bigger and louder so he fills a large room...the scale of that professor is as if he were talking to a class of 30 or 40."

Butler also thinks that film reaches students better than television because they are accustomed to considering it a more serious medium and thus are more attentive. Then, too, film—if done right—can capture lecturers at their best. "Every professor has bad days, but we eliminate them," says Butler. "We try to film the 'best day,' and then it can be repeated."

For more information: Lloyd H. Lofquist, Chairman, Department of Psychology, University of Minnesota, Minneapolis, MN 55455; (612) 373-4165.

Coming to Terms With the Only Certainty

The content of the University of Cincinnati's course "The Psychology of Death and Dying" proves so threatening that students often discover they can discuss it only with their classmates. The instructor, associate professor Venus Bluestein, feels that the unsettling fact of death must be faced, that we cannot be fully constructive with our own lives until we confront and accept death's reality. To that end, the course covers such topics as suicide, aging, funerals, euthanasia, the psychology of grief and bereavement, the psychosocial aspects of widowhood, counseling the dying, and teaching children about death.

The subject matter is presented the first day of class and all students fill out a 19-page questionnaire designed as an abrupt orientation. One or two students each year drop the course immediately, discovering with disappointment that the material will not probe the occult, or with alarm that they are not yet ready to deal with such material after all. Enrollment is limited to 75, but, suggests Bluestein, without teaching assistants her course starts to get unwieldy with only half that many.

There is no set syllabus for the course. The class meets for lectures, films, and small group discussions. Each student contracts for a grade and each grade is determined by the number and variety of outside projects completed. These range from watching television shows ("Eric," "Death Be Not Proud," "MASH") and visiting death-oriented institutions, such as cemeteries, funeral homes, and crematoria; to assembling scrapbooks, reading and critiquing published articles, and writing more traditional term papers.

Bluestein also encourages original research. In the past, students have analyzed attitudes toward funerals among various age groups, done psychological autopsies on relatives who have committed suicide, and studied concepts of death among children. Most students willingly contract for an A, and, declares Bluestein, most of them earn it. Occasionally, however, contracts are renegotiated.

The course is designed for students specializing in social service disciplines, such as medicine, nursing, psychology, education, or sociology. But students enroll from diverse disciplines. Significantly, 85 to 90 percent of them have experienced strong emotional reactions to death themselves. Consequently, the course often serves as a kind of therapy for such students, and Bluestein finds herself dealing with her students on a one-to-one basis far more often than in any of her other courses.

Though Bluestein has made no study of graduates of the course, end-of-the-year assessments written by her students pronounce the course valuable and declare that the students have in fact taken personal inventory, that they have grown closer to relatives facing death, and that in many instances they have lost their morbid dread of dying. Nursing students claim to be much more effective with the terminally ill.

Bluestein's course grew out of an intuition about student needs, based upon responses she had observed to the suicide section of the department's general psychology course—and out of her own response when her husband was overtaken by a serious illness. Bluestein recognized the growth that comes from confronting death, and this is what she tries to communicate in her course.

For more information: Venus Bluestein, Department of Psychology, University of Cincinnati, Cincinnati, OH 45221; (513) 475-3631.

Science Fiction: A Painless Path to Basic Principles

In introductory psychology courses most teachers hope somehow to get across to their students a set of concepts that are basic to the discipline. This task is often approached head-on with straightforward lectures and readings followed by tests to see how well the material has sunk in. While this is undoubtedly the most direct approach, many teachers find it is unbearably dull for students and introduces them less to the joy of learning than the joy of sleep.

At the University of Tennessee at Knoxville, two graduate teaching assistants have replaced this direct approach with one that comes more through the back door. The key to it is science fiction.

"Science fiction can [introduce elementary concepts] for you very painlessly at times," says James Oshinsky, who teaches the course with Stephen Anderson. "If you sit students down with a 700-page traditional introductory textbook, some people fall asleep long before they finish the book. People who like reading fiction can get the same thing without so much suffering."

Oshinsky and Anderson built their course mainly around two anthologies of science fiction stories selected for their psychological themes—Introductory Psychology Through Science Fiction (Katz, Warrick, and Greenberg, editors) and Valence and Vision (Jones and Roe, editors). The latter, incidentally, they found the better of the two.

Their basic technique is to assign stories from the two books on the assumption that most students are clever enough to recognize the psychological issues raised by the fiction. Just to make sure, the teachers offered in advance of the assignments a list of the important concepts to watch for. The class meetings consist of a discussion of the stories, accompanied by occasional mini-lectures.

The use of the story "Flowers for Algernon," is a good example of how the technique works. The story concerns a mental defective named Charly, who is offered the same brain operation that has proved successful in dramatically raising the intelligence test scores of a mouse named Algernon. Charly, who has lived simply but happily with his low IQ, becomes much smarter but increasingly unhappy following the surgery.

The story is used in a section of the course on intelligence and intelligence testing. "Some students want intelligence defined as what can be measured by the normal intelligence tests," says Oshinsky, "while others prefer to define it in a broader way as the ability to adapt to one's environment—the ability to survive." Students are typically not of one mind. "They argue forever," Oshinsky says. "Whatever differences of opinion there are in the psychology profession are recreated in the classroom."

A couple of factors may be especially important to the course's apparent success in engaging students: For one thing, it was taught in a small class of 16 students, which made the discussion method manageable. For another, it was offered to especially able students—as an introductory course for freshman and sophomore honors students and for more advanced psychology majors.

One exercise that proved quite successful with students of this caliber was having them write their own science fiction stories on psychological themes. One story, for example, involved a man who proved empirically that extra-sensory perception was impossible—only to discover he possessed it himself.

One of the most revealing pieces of evidence about the power of science fiction as a motivator came from a student evaluation. Virtually all students gave high marks to the science fiction books. But a third book of conventional readings that Oshinsky and Anderson used as a supplementary text was considered by 12 of the 16 students to be "dry," "too tough," or outright "bad."

For more information: James Oshinsky, Department of Psychology, University of Tennessee, Knoxville, TN 37916; (615) 974-2389.